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Railway Age Gazette

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* Illustrated.

Those who have been following carefully the Equipment and Supplies column of the *Railway Age Gazette* for the past few

Heavy Locomotive Purchase

the end of last week totaled 724, being at the rate of 6,275 for the full 52 weeks of the year, or about the same rate as the record figures for 1905. January and February are always good months but up to the end of the second week of February last year the locomotive orders totaled only 280, although the total for the entire first two months last year was 770. The locomotive plants are filled up with orders for nearly a year ahead; a railway that orders locomotives at the present time will be fortunate to secure delivery before the first of next year. The railways, nevertheless, continue to place large orders. They look forward evidently to sustained high prices, to poorer and poorer deliveries and realize that they need power and will continue to need it in increasing degree as the demands upon them continue to increase and as locomotives now in service begin to wear out.

An officer of a western road recently made the statement that each department of a large railroad system should have on its

What Are Statistics Good For?

out of the statistical department. The amounts which are spent by American railroads in compiling statistics bearing on the functions of the various departments are extremely large, and no one who knows the importance of these comparative figures to the officers will question the wisdom of the expenditure. Some of the statistical data which the railroads compile is readily analyzed, and the important figures, such as average tons per train, or pounds of coal per thousand gross ton-miles, are always readily available. A closer analysis of data which

is regularly compiled would develop important facts which are not brought out in the routine reports. The head of a department may desire more information than that regularly furnished him, but he cannot take the time to get it himself, and a clerk could not understand its meaning or application, and would overlook important points. Great stress is laid on the comparison of results for successive months, and the comparison with figures for the corresponding months of the previous year, but statistics are no less important as a means of forecasting results by comparing a proposed method with the one in practice. The great expenditure for statistics is relied upon to show the leaks and determine wasteful methods. The field of the statistician should be broadened and he should give more attention to the possibility of constructive activity. The statistical department has long been depended upon to keep costs from going up. It is time that we recognize that it lies within its province to show how costs can be brought down,

The study of brown punk, reported in the annals of the Missouri Botanical Gardens, is of the utmost importance to the

Co-operative Study of Timber

in that it was made possible through the financial support of the Southern Pine Association. Although the lumber industry is one of the oldest it has lagged behind many others in the scientific study of its product and its difficulties. The producers of timber have been too engrossed in the operation of their saw mills and in competing with each other in the sale of their products to give any concerted attention to means of counteracting decay and other natural enemies of timber. Because of this neglect to co-operate with the users in studying means to increase the life of timber, large consumers of lumber have gone to other construction materials in many instances and the demand for wood has decreased, at least relatively. The fact that a group of large producers of lumber have

producers and users of coniferous woods, because this fungus is most destructive to these classes of timber. However, even a greater significance is attached to this highly technical study

realized this condition and have organized to finance jointly an investigation as highly technical in character as the one referred to above, however important it may be to the industry, indicates that they have acquired a broader view of present day merchandising practices that speaks well for the future of the industry and will result to the benefit of the railways and other consumers in their further use of timber. Such studies might be multiplied materially with equal value to the railways and the producers alike.

A SLIDING SCALE FOR COAL RATES

F. J. LISMAN, of F. J. Lisman & Co., has been advocating in letters both to the *Railway Age Gazette* and the Coal Trade Journal that the railroads adopt a sliding scale of freight rates on coal, the rate being higher in winter than in summer. For example, if the rate at present between certain mines and certain markets is \$1, the rate in March would be \$1, in April 95 cents, in May 90 cents, in June 90 cents, in July 90 cents, in August 95 cents, in September \$1, in October \$1.05, in November \$1.10, in December \$1.10, in January \$1.10 and in February \$1.05.

The *Railway Age Gazette* has made inquiry among officers of some of the larger eastern coal roads and has found a considerable divergence of opinion. On some roads there is not a great difference between the tonnage of coal moved in the summer months and in the winter months and on these roads it is felt that there would be no advantage to be gained from a sliding scale and if such a sliding scale were adopted it would appear that the greater bulk of traffic which would be induced to move in the summer would pull down the average ton-mile rate on coal for the whole year to a considerable extent. On other roads where the movement of coal and consequent shortage of coal cars is much heavier in winter than in summer, Mr. Lisman's suggestion is received as something devoutly to be wished for. But some railroad officers express the opinion that any attempt to induce the consumer to make purchases at one time rather than at another is a part of the coal business and not a proper concern of the railroad officer.

Almost without exception, railroad men had doubts as to whether a sliding scale of rates such as that suggested could be filed with the commission without the danger that after the rates had been reduced in the summer, shippers would protest to the commission and have the advance rates suspended. Apparently judging from past practice of the Interstate Commerce Commission, if a series of tariffs were filed, each bearing its specific effective date, any one of these tariffs could be protested against in accordance with the commission's rules, and such a tariff would be subject to the same procedure as a tariff not part of a series of tariffs. There have been instances where tariffs had been filed with the commission providing a specific date of expiration and referring to some other item for rates applicable after such expiration date, and the commission has suspended such expiration date although the item of which it formed a part had already become effective.

While the relations between coal consumer and dealer are not the concern of railroad traffic officers, to advance this as an argument against doing something that will in all probability lessen coal car shortage in the winter months is to dodge the question. The consumer has got to be persuaded to use his empty coal bin in summer as a storage place for his next winter's coal if a greater movement of coal from mines to markets is to be induced. Dealers in some parts of the country do offer an inducement to consumers to buy coal in the summer by offering lower prices per ton in the summer months, but it is pretty certain that a wider spread of prices would bring into use a very much greater consumer's storage space.

The dealer, however, has no very great incentive to make a

large spread in prices. A shortage of coal means higher prices to the dealer per ton and only a small reduction in consumption. The domestic consumer has to have a fire in his range and in his furnace whether the price of coal is \$6 a ton or \$10 a ton. It may be quite possible also that there is a very considerable amount of storage room available to retailers which is not now being used for coal. If, however, there was a sliding scale of freight rates, not only could retailers make a wider range in rates to consumers between summer and winter than they do now, but there would be a greater incentive for the dealer who had available storage room to utilize it to its fullest capacity if by so doing he could save 20 per cent on the freight rate on his coal.

There is presented here, however, one of those cases where co-operation between different railroads and between the railroads and the Interstate Commerce Commission is a necessary precedent to any effective action. Such co-operation will not come of itself. Somebody must get back of such a movement and work hard to bring it about. As a preliminary step to this it might be worth while for some of the operating officers and some of the traffic officers on roads doing a considerable coal business to make a careful study of their own situation to see if a remedy such as Mr. Lisman suggests would not be of very real value.

ASSOCIATION OF RAILROAD SUPERINTENDENTS

THE practical character of the work which the American Association of Railroad Superintendents is doing is evidenced by the list of subjects which its committees now have under investigation as outlined in the *Railway Age Gazette* of February 9. The membership in this association is composed primarily of division superintendents and train masters who are confronted with the duty of handling traffic economically. Their problems are peculiar to this branch of railway service and call for concentrated attention just as much or more than those in other departments.

The mechanical department with its 10 or 12 organizations has long been active in the joint investigation and solution of its problems through association work. The engineering department is similarly equipped with five active organizations. Although the work of the transportation department is of at least equal complexity and importance co-operative association work has not been as firmly established in that field in spite of the fact that there are a larger number of men of the same general rank as those in the other departments who would be eligible for membership. The Superintendents' Association is an old organization but it has had a struggle for existence at various times because of the lack of support which the railways have given it. As late as 1911 it had only 12 members but as the result of the concentration of a large amount of energy upon it by a small group of men the membership has now grown to over 800 and its work has increased in amount and value in like proportion.

This association deserves and is entitled to the active support of the railways because of the excellent work which it is doing, the beneficial effects of which accrue to the roads in increased efficiency of operation. New problems are arising in such numbers and improved methods are being developed to meet changing conditions on individual roads so frequently that the freest exchange of ideas is desirable in order that all may share the benefits now secured by a few. No one can question the value of the full discussion of methods of creating a better feeling between yard, train and engine men in view of the general unrest and rivalry among the employees in this branch of the service today. Likewise the best methods of handling home route cards, the conservation of equipment and means of reducing loss and damage claims are vital to the protection of the revenues of the roads. The handling of live stock in compliance with the federal

laws introduces a problem of another character which confronts the superintendent directly. These illustrate the character of the discussions which this association can and is undertaking to excellent advantage. The railways should realize the benefit of this work to themselves and should encourage it in all ways, urging their men to become affiliated with the organization and to participate actively in its work.

INCREASING THE TRAIN LOAD

IN 1910 the Norfolk & Western handled 6,722,495,887 ton miles of freight with 10,578,541 revenue freight train miles. In 1916 12,131,187 revenue freight train miles were required to move 11,795,891,557 tons one mile. In other words, it required an increase of less than 15 per cent in train miles to take care of an increase of over 75 per cent in the freight handled. This was made possible by an increase in the revenue train load from 635 tons in 1910 to 957 in 1915, or 50 per cent in 6 years.

Increases such as these are not confined to the Norfolk & Western but are also being secured on a number of other roads. However, they are by no means universal. The importance of records such as these should be self evident and they would appear to justify the concentration of attention on this subject on every road. The ability to increase the average train load does not depend alone on the expenditure of large sums of money for the reduction of grades and the installation of heavy locomotives. Much improvement can be made without any expenditure by the exercise of close supervision and by concentrating the attention of the operating officers on this problem. In fact some of the most marked improvements have been made by these methods without expending any large sums.

We believe that one of the most important, if not the most important, opportunity to increase the net revenues of the railways lies in increased attention to this subject. We have, therefore, announced a contest on "Increasing the Train Load" to which we invite contributions from those who have given this subject consideration and who are in a position to describe methods which will aid in increasing the train load. Prizes of \$35 and \$25 will be paid for the two best papers received, while we will also pay for all other contributions accepted and published at our regular space rates. The judges will base their awards primarily on the value of the ideas presented and on the completeness with which the subject is discussed. Contributions should be sent to the editor of the *Railway Age Gazette*, 608 South Dearborn street, Chicago, and must be mailed not later than April 1 to be considered by the judges.

NEW BOOKS

Proceedings of the American Society for Testing Materials. Edited by Edgar Marburg, secretary-treasurer, University of Pennsylvania, Philadelphia, Pa. Two volumes. Illustrated, 6 in. by 9 in. Part 1, 614 pages. Part 2, 502 pages. Bound in paper, cloth and half leather. Published by the Society, Philadelphia, Pa. Price per volume, paper \$5, cloth \$5.50, half leather \$6.

These volumes contain the proceedings of the 19th annual meeting held at Atlantic City, N. J., June 27 to 30, 1916. The first book contains the reports of the committees and tentative standards. Among the reports of particular interest to railway men are those on preservative coatings for structural materials, the preparation of iron and steel surfaces for painting, methods of laboratory sampling and analysis of coal and proposed revisions in tentative methods for sampling and analysis of creosote oil. The tentative standards are printed in the proceedings for one or two years for the purpose of eliciting criticism which the committee will consider before recommending final action tending towards the adoption of these standards. Among these tentative standards are specifications for cut and screw track spikes, tie plates, copper plates for locomotive fire boxes

and copper bars for locomotive stay bolts, Douglas fir bridge and trestle timber, and yellow pine timbers to be creosoted.

The second volume consists of technical papers presented before the association, among which are a number of special interest to those in railway service. Included among the papers of this class are those on Heat Treatment of Carbon Steel Locomotive Axles: Water versus Oil Quenching by C. D. Young, and A New Form of Specifications for Concrete Aggregates by Cloyd M. Chapman.

Statistics of Common Carriers, 1916; Preliminary Abstract. Interstate Commerce Commission, Washington, D. C. 237 pages, 9¼ in. by 11½ in. Paper cover. To be had from the Superintendent of Documents, Government Printing Office, Washington, at 35 cents a copy.

This is the sixth annual issue of the commission's preliminary abstract compiled from the reports rendered by the more important carriers in the United States for the year ending June 30, 1916, and including tables for all steam railway companies that reported annual operating revenues above \$1,000,000, showing for each company, mileage, general balance sheet figures, income account, profit and loss account, operating revenues and expenses in detail, statistics of rail line operations, particulars of equipment in service, revenue from freight carried, recapitulation of hired freight cars, and an analysis of general operating expense accounts with respect to class of service, as required in the commission's rules effective on July 1, 1915. Three pages are devoted to abstracts from the annual reports of the principal express companies and one to an abstract from that of the Pullman Company. The statement of the aggregate statistics for the whole country for the year has not yet appeared.

The analysis of operating expense accounts tabulates the expenses related solely to freight service, those related solely to passenger and allied service, the common expenses and the expenses not related to either freight service or passenger and allied services, giving an apportionment of the common expenses between freight and passenger, together with a column for the expenses not apportioned.

Construction and Maintenance Costs. By A. H. Plant, comptroller of the Southern Railway. 81 pages.

The full title of this, the first of a series of pamphlets on railroad accounting which Mr. Plant is preparing, is "A Letter to the General, Departmental and Divisional Construction and Maintenance Officers, Their Agents and Assistants, About Construction and Maintenance Costs." The pamphlet is prepared for use on the Southern Railway and its subsidiary and affiliated lines. In the form of a letter Mr. Plant explains the basis on which accounting officers record the transactions of maintenance officers. Taking the five general accounts, Physical Property, Operating Expenses, Individuals and Companies, Materials and Supplies, and Profit and Loss, the author explains the meaning of these terms and, in a broad way, what is included in each. A thorough knowledge of what constitutes additions, betterments or retirements is necessary to the maintenance officer if he is to report intelligently the work which his forces are doing. The examples that Mr. Plant gives are clearly explained, with a minimum of references to the theory which lies behind the Interstate Commerce Commission's classification of changes in physical property. Accompanying this letter are illustrations of the classification of work done by the maintenance of way and structures department and by the maintenance of equipment department, and also extracts from the official classification of the Interstate Commerce Commission pertaining to maintenance of way and structures and maintenance of equipment.

It is to be hoped that this pamphlet will have a much broader circulation among railroad officers than would be implied by its form as a letter to officers of the Southern Railway.

Letters to the Editor

COLLEGE MEN AND THE RAILROADS

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The question is frequently asked, why is it that the railroad service does not attract university graduates? I can tell you one reason, which is that the loss of caste that comes with railroad service is repugnant to a university man of culture and appropriate self-respect.

There was a time in this country when a railroad pass was a badge of honor and distinction. Now it is an emblem of servitude and a mark of disfavor.

Why, because a man has dedicated his talents to the railroad service, should he be compelled to ride on second-class trains, sleep in upper berths, and find his fellow servants officially encouraged to give his comfort and convenience as little consideration as feasible short of downright discourtesy? Are railroad men as a class the better for this disparagement of their pride?

The term railroad service has come to have all the odium that attaches to service in a hotel, where it means accepting eating and sleeping accommodations that would be too poor to offer to guests.

CLERK.

DISTRIBUTION OF LOADING ON TRAINS

BOSTON, MASS.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

The letter on "Distribution of Loading on Trains," page 47 of your issue of January 12, raises the question of why a train pulls harder with the empties in the front and the loads in the rear.

A partial explanation is as follows: For the sake of simplicity assume a train of two cars of exactly similar construction, one light and the other loaded. Let H be the drawbar pull required to pull the loaded car alone and L be the drawbar pull required to pull the empty car alone. H will be greater than L . In rounding curves the drawbar pull acts at an angle to the tangent to the curve drawn through the center of the car. For simplicity assume that the drawbars are pivoted at the center of the cars. This does not alter the essential principle involved.

In Fig. 1 the loaded car is coupled in front of the empty car. The drawbar pull between the engine and the first car is $H + L$, and that between the first and the second car is L . In this case we will assume the speed so slow that the centrifugal force is practically negligible. Let the angle between the draw bar and the tangent to the curve at the center of the car be α . The side pressure between the first car and the rail is $(L + H + L) \sin \alpha$. The side pressure between the second car and the rail is $L \sin \alpha$. The total side pressure is the sum of these two, or $(3L + H) \sin \alpha$, and this quantity multiplied by the coefficient of friction f gives the drag due to the curve with this method of making up the train.

In Fig. 2 the heavy car is coupled behind the light one. Following the same method of analysis the total side pressure is $(3H + L) \sin \alpha$, and this multiplied by the coefficient of friction f gives the drag due to the curve with this method of making up the train.

As H is greater than L , $(3H + L)$ is obviously greater than $(3L + H)$, which proves that a train made up as shown in Fig. 1 will haul easier on curves than one made up as shown in Fig. 2. In other words, the side friction will be much greater when the empty cars are at the front of the train and the loaded cars at the rear.

The same effect will be observed in going over summits, as will be seen if the curves in Figs. 1 and 2 be considered as summits or vertical curves in track instead of horizontal curves. The additional friction will be journal and rolling friction instead of flange friction. In sags the reverse proposition will be true, but trains do not ordinarily stall in sags, so the aid received in this case by having the heavy cars in the rear would not be noticed. It would seem that the drawbars would be subjected to greater strains with the heavy cars in the rear when running through a sag. Neither do they usually stall overhanging on either side of a summit, but these cases are mentioned as illustrations of the working of the principle. Curves are the places where the trouble should be most noticeable. If the track is perfectly straight and either level or on an even grade, the order in which the train is made up ought not to affect its resistance to being pulled.

The effect of centrifugal force is important in this connection. The centrifugal force is given by the following

$$\frac{WV^2}{32.2R}$$

formula — where W equals the weight of the car in pounds, V the velocity of the train in feet per second, and R the radius of the curve in feet. For a curve of constant

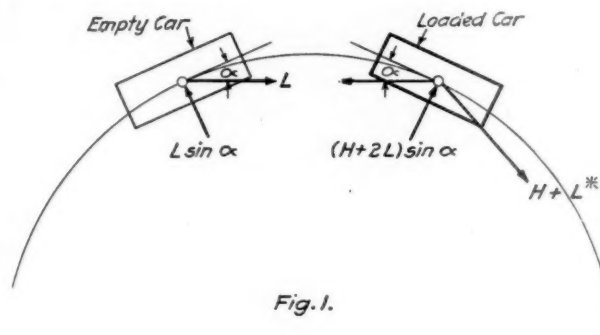


Fig. 1.

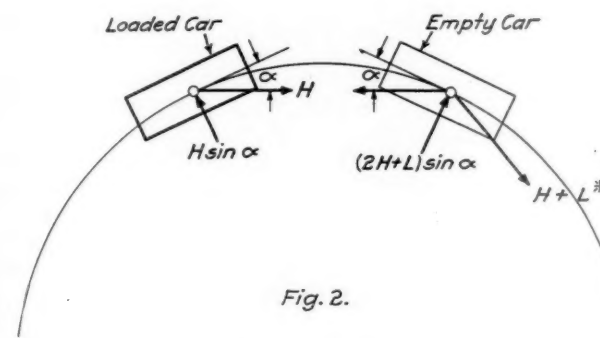


Fig. 2.

*The additional drawbar pull required to overcome the friction caused by the side pressure between the cars and the rails will operate to increase these forces unequally. It is purposely omitted to avoid confusion. It should be understood that its effect in the last analysis is to still further increase the inequality existing between the two cases considered.

radius and for any given speed the centrifugal force is exactly proportional to the weight W of the car.

At any given speed and radius of curvature the total side pressure on a given train will be the same no matter in what order the train is made up. Unless, therefore, the speed is great enough to cause the cars to run against the outer rail of the curve, the proposition remains as before, as the side pressure in both cases will be reduced by the same amount, thus leaving the inequality in a condition as in the original case. As a practical matter, if sufficient speed can be attained on all the curves the train will be light enough so that the order of making it up will not affect appreciably its ability to get over the road.

The super-elevation of the curves will affect the result in

a manner similar to the effect of centrifugal force but opposite in its general direction. It will not affect the general validity of the conclusion demonstrated above.

For those who desire a more rigorous mathematical demonstration than the above the following result is given. H and L represent the resistance of the loaded and empty cars to being pulled on a straight and level track. P_1 and P_2 are the drawbar pulls the locomotive must exert in Fig. 1 and Fig. 2 respectively. Other quantities are as before. Then

$$(\cos a - f \sin a) P_1 = H + L \frac{\cos a + f \sin a}{\cos a - f \sin a}$$

$$(\cos a - f \sin a) P_2 = L + H \frac{\cos a + f \sin a}{\cos a - f \sin a}$$

A careful inspection will show that P_2 is greater than P_1 and hence the proposition holds true.

LEWIS E. MOORE,

Bridge and Signal Engineer, Massachusetts Public Service Commission.

COAL RATES AND CAR SHORTAGE

NEW YORK.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

Referring again to the matter of a sliding scale of coal rates, *The Black Diamond*, a newspaper devoted to the coal trade, estimates that the 600,000,000 tons of coal consumed yearly are absorbed about as follows: 150,000,000 tons or about 25 per cent by the railroads; 135,000,000 tons or about 22½ per cent for domestic consumption; 315,000,000 tons or about 52½ per cent by manufacturers, public utility corporations, office buildings, etc.

This newspaper calls attention to the fact that the large manufacturers who are located in the big cities, the large office buildings, hotels, etc., cannot possibly store any large amount of coal because space in or adjoining their buildings is entirely too valuable for that purpose.

As to the domestic consumption, at present very little, if anything over 25 per cent consumed for this purpose moves prior to October 1. Assuming it moves, however, as much as 25 per cent, then coal for that purpose would be moving at an average rate of about 6,000,000 tons per month from April 1 to September 30 and at the rate of about 16,500,000 per month from October 1 to March 30.

A sufficient inducement will prompt a large number of domestic consumers to store their winter coal during the summer months in their own cellars and if the summer movement can thereby be increased by only 2,000,000 tons per month and the winter movement be reduced correspondingly, the winter situation, that is, the peak load during the winter, would be greatly reduced. Furthermore there are many large manufacturers not located in big cities who watch every penny of expenditure and who can surely be induced to put in a large stock of coal during the summer months if it is demonstrated to them that it is to their interest to do so. Furthermore, the railroads themselves can "get this habit."

Nobody expects that the coal movement can be equalized during the twelve months but if intelligent and consistent efforts are brought by the railroads and the coal trade there is no question but that the summer movement of coal can be increased somewhere between 3,000,000 to 5,000,000 tons a month and even more and the winter movement correspondingly reduced.

Figuring an average of 50 ton cars on an average of only two round trips of cars per month between mines and market, 5,000,000 tons per month would mean an increased steady usage of about 50,000 cars (now lying idle) during the summer months. This would go a long way towards relieving the winter congestion.

The coal consumer during the winter of 1916-1917 has

undergone an entirely novel experience. Hitherto the consumer has generally been able to get coal at his own price. Lately, in many cases he has not been able to get it at all. This experience, being dearly paid for, is liable to stick. Consumers hereafter will be ready to make contracts by the year more than ever, provided always that the mine operator does not try to overreach, and as a consequence thereof the consumer finds he has made a mistake in entering into a contract for a year ahead.

Simultaneously with this new era of contracting in the coal trade, the matter of rate adjustment should be pushed as an additional inducement for buying coal during the summer months. Furthermore, the American Railway Association with the co-operation of the Interstate Commerce Commission is up against a great problem. A sliding scale for coal rates is one of the methods, and a very important one, of helping solve the car problem. I trust the work will be taken up promptly.

F. J. LISMAN.

THE HEN AND THE ERIE FERRY BOAT AGAIN

CHICAGO.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

It would seem that the article by Mr. James on depreciation, reprinted in your issue of January 19, overlooks some fundamentals. Ignoring the fact that the value of a hen is not one-fifth gone when her service life is one-fifth gone if the worth of money be considered, and assuming that Mr. James adopted the straight line theory for simplicity of illustration, there still remains the error of assuming that under public regulation the fair rate for service is the value of the service to the consumer, rather than that which will yield a fair return on its sacrifice to the agency performing the service. Who shall say what the value of service to the consumer is? If under a normal market eggs sell for thirty-five cents a dozen, are they worth this to the consumer? And if so, are they worth twice as much when some cold storage concern corners the market on eggs?

Then to come to the ferry boat example. The present writer does not know the circumstances further than Mr. James states them and so is not in a position to express an opinion of the action of the Interstate Commerce Commission; but he can express an opinion of the position taken by Mr. James, and at the risk of being classed among the know-nothing college professors.

If the ferry boat company owns a ferry boat that is approaching the end of its service life and has been paid by the public during the years of service of the boat, (1) all operating expense; (2) interest and profit on investment (we will not say whether original or remaining investment as that appears from time to time), and (3) the full loss of value due to the loss of service life; and the company has taken the depreciation payments out of its ferry boat business and invested them in other public service property—as railroad property; does Mr. James think it would be fair that the public should continue to pay in ferry charges interest and profit on the original cost of the ferry property, and, also, to pay interest and profit on the investment in the railroad property? That is to say, shall the public pay interest and profit not only on what the public service company has put into the property but, also, on moneys contributed by the public itself? Shall the corporation eat its pie and have it, too?

There are circumstances of accounting which would make it proper for the public to continue to pay interest and profit on the undiminished, original investment, but Mr. James' argument does not turn on these circumstances but on present capacity of the property to serve, a bubble that the present writer supposed had been pricked long ago.

Forgetting the competitive character of the egg business as compared with the ferry business, if the ferry company had

reinvested its depreciation receipts in ferry boat improvements or additions, it would still be entitled to a full return and the case would then be comparable to the farmer and the hens. But it is not comparable when the depreciation receipts are taken out of the business, and simply pocketed or put into some other business. Moreover, competitive business of a wholly private character cannot be compared in this way with wholly or partially monopolistic business, operating under public franchise and subject to regulation. Under great provocation some day the public may regulate the egg business, and what will then govern the price of eggs?

WM. G. RAYMOND.

TO REDUCE THE BULK OF LETTER FILES

CHICAGO.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

In these days of high prices for paper and everything else your readers should, no doubt, be interested in every reasonable method of economy; and why not save a sheet, in replying to letters, by making your carbon copy on the back of the letter received? Every railroad uses large quantities of paper, and the saving by this practice would be by no means inconsiderable. Also, it would be a primary lesson in economy, useful to all in the office; and any one who knows of the waste of stationery in railroad offices will agree that a lesson of this kind is timely.

Beginning with the first letter which opens any subject, the recipient of such a letter, in replying to the sender, or in writing to someone else on the same subject, can, usually, use the letter received for his carbon copy. Thus he saves one sheet of paper, and in his file he has two letters on one sheet. The carbon paper is placed on the back of the last letter on the subject in hand, and this letter is turned upside down; so, when it is placed in the typewriter, the operator, in beginning to write, can readily see the date and the file number of the letter that is being answered.

I have been following this practice for a year, and my files are noticeably small, compared with those of former years.

J. S. SHEAFE.

WAYS TO PREVENT CAR SHORTAGES

SAN FRANCISCO, Cal.

TO THE EDITOR OF THE RAILWAY AGE GAZETTE:

I was very much interested in the editorial appearing in the November 24 issue of your publication, dealing with the subject of a remedy for car shortage. On analysis I believe it will be conceded by the majority of the people that there is sufficient equipment in the country to move the business offered if its use were confined to the purpose for which it is designed. The freight car is a unit for the transportation of freight from the point of origin to destination. Four things are essential for securing its maximum operating efficiency: Prompt movement to the point where it will receive loading; prompt loading; prompt movement to destination; and prompt unloading at destination and release for further and similar handling.

As a general proposition there is not much delay in the first and third operations. With most commodities 48 hours' free time is allowed for loading and unloading, and in some sections of the country 72 hours' free time is given for the loading and unloading of certain commodities. When consideration is given to the fact that the greater portion of the volume of the business of the country moves to and from industrial centers involving a haul within a radius of 200 miles, the utilization of this free time at originating and terminating points discloses the principal cause for the low daily average mileage made by the freight cars in the United States. One of the chief mining products transported is coal, on which 48 hours' free time is allowed for loading and unloading; in some instances 72 hours is given for unloading.

It rarely consumes more than a few minutes to load a coal car at the tipples, and as the majority of these cars are constructed with hopper bottoms they can also be unloaded in a few minutes. Regardless of the type of car used, however, coal is not a perishable commodity and can be loaded and unloaded in any kind of weather, and it seems no hardship would be worked upon any one if the free time on this commodity were reduced to 24 hours. In fact a careful study should be made of the various commodities to ascertain those which can be handled in and out of cars within a 24-hour period and the free time should then be adjusted accordingly.

There is also room for material improvement in car loading. In many instances the existing minimums prevent increased car loading. During the present car shortage we have received the hearty co-operation of many of our shippers and they have unhesitatingly loaded two minimums in one wherever the commodity handled and the cubical car space would permit. There is no question, however, but that minimums should be revised to keep pace with the increasing capacity of equipment.

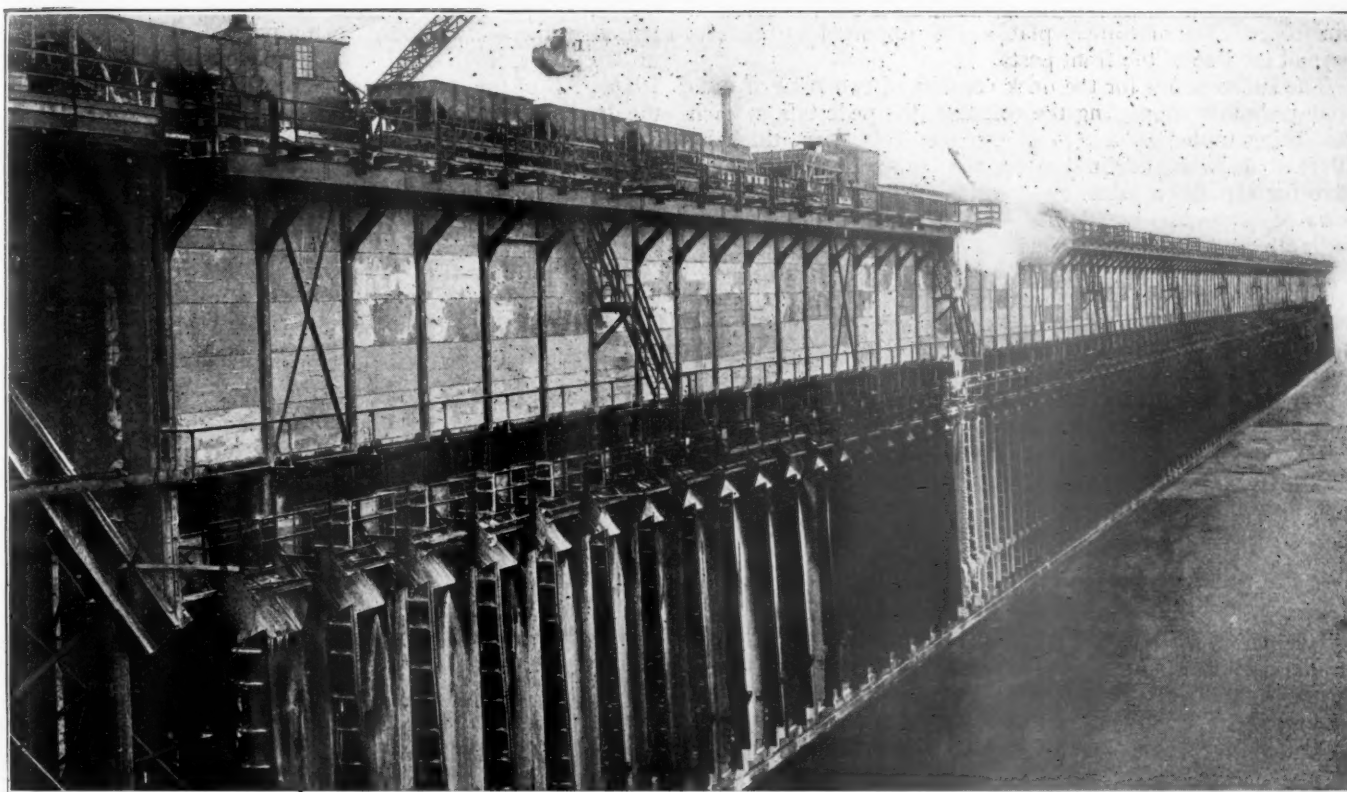
The mileage made by cars also offers opportunity for improvement. On the Pacific system of the Southern Pacific we have averaged 50 miles or better per day with foreign equipment, for several years, but, as previously indicated, the greatest assistance in this direction could be secured through decreasing the free time allowed for loading and unloading, and insuring the early release of cars through the medium of a high demurrage rate. In California and Arizona 24 hours' free time is allowed for the loading and unloading of tank cars. We have a record of an average of 80 miles per day with this class of equipment, which includes the movement and delivery of all company fuel oil and the shipment of oil into other states where 48 hours' free time is allowed.

Another factor to be considered during times of car shortage is the abuse of the diversion privilege, and this no doubt will be corrected. To avoid car shortages it will be necessary to discontinue the use of freight equipment for storage purposes in connection with the handling of freight. The acute car situation existing in the country at the present time had its origin on the Atlantic seaboard, where large quantities of freight are awaiting vessels at the different ports for transshipment. At such points there is generally no restriction as to free time, especially on export business, and with this privilege there was no incentive for the shipper or consignee to insure bottoms being provided at the time the freight was forwarded. There is also an unusually large increase in local freight business in eastern and middle-western territory moving towards the Atlantic seaboard, calling for an increased number of cars. Business between the Pacific and the Atlantic coasts has preponderated eastbound for about three years, and this has also had a tendency to increase the number of cars on the Atlantic seaboard and contribute to the congestion at points along the eastern coast.

There is no good reason why railroads should provide storage in cars indefinitely for freight going to any destination. The laws of the land generally contemplate storage as auxiliary to transportation, and in order to secure the maximum and proper use of freight equipment there should be provided at all points of transshipment or transfer suitable warehouses into which the freight can be unloaded or transferred and where cars can be placed and promptly unloaded or loaded. If such facilities were provided the use of a great deal of valuable property for storage tracks would be avoided, the business of the country could be carried on without interruption, and the expense of construction and operation of such storage terminals should be borne by the traffic of the country, which is directly benefited thereby.

W. R. SCOTT,

Vice-president and General Manager, Southern Pacific.



The Completed Dock

A Large New Ore Dock for Lake Superior

The Duluth & Iron Range Has Recently Added a Concrete and Steel Structure to Its Plant at Two Harbors

WITH the opening of navigation for 1917 the Duluth & Iron Range will place in operation a new concrete and steel ore dock at Two Harbors, Minn. This will be one of six docks operated by the railroad at that port in transferring iron ore from cars to lake boats. During 1916 the total tonnage of ore handled at that point was about 11,000,000 gross tons. The new dock is designed for a total pocket capacity of about 11,856,000 cu. ft., which gives a total capacity of ore of maximum weight of 94,000 tons, although with ore of ordinary weight the capacity is about 70,000 tons. The dock is the third one to be constructed of steel and concrete at this point.

THE NEW DOCK

The new structure consists of a four-track dock of 1,368 ft. long with a 768 ft. approach trestle accommodating two tracks, 318 ft. of which is of steel construction and the rest of timber. The steel approach is of typical viaduct construction with 30-ft. tower spans and 62-ft. clear spans. The deck plate girders support reinforced concrete ballasted decks which are particularly applicable in accommodating the switch connections to the four dock tracks. The timber approach is on a 0.4 per cent up grade to the dock and the steel approach and dock proper have a level track grade.

The total height of the dock is 80 ft. from base of rail to mean water level. The total width between bin fronts is 56 ft. but overhanging platforms on each side extend about 9 ft. further. There are 228 pockets arranged in pairs on either side of the ridge along the longitudinal center line of the dock formed by the junction of the bin floors sloping each way at an angle of 48 deg. The bins are about $4\frac{1}{2}$ ft. deep

on the inside and about 28 ft. deep on the outside or front. Their width is 12 ft. center to center of partitions and each bin has a capacity of 5,200 cu. ft.

The frame, which is of structural steel, is clearly shown on one of the photographs. This consists of steel bents located in the planes of the partitions between the bins. Each of these bents consists of two supporting columns spaced 42 ft. 6 in. center to center upon which are superimposed an A-frame, consisting of the two main sloping bin girders and the structural steel ties with which they are united to form a truss. Supported on the bin girders are vertical columns which serve both as the framework for the partitions between the bins and as supports for the track floor above and its live load. Adjacent bents of the framework are connected by bin floor beams between the bin girders and by the track girders of the track deck. These girders are 21-in. I-beams to which the rails are riveted.

Structural steel serves only as the supporting framework of the dock. All bins floors, partitions and corner fillers are of concrete, the sloping bin floor and front wall being of unit construction while the side walls, ridge partition and deck floor were cast in place. The track deck is covered by reinforced concrete slabs in the spaces between tracks, the spaces between rails being left open for dumping of cars. Every 12 ft. longitudinally there is a 2-ft. cross walk connecting the longitudinal walks. At intervals of 144 ft. iron stairways lead down to continuous platforms at the level of the outlet doors. These platforms have plank floors, the only timber used in the structure.

A special detail of interest is the use of tie rods embedded in the concrete side partition walls to take the thrust of the

bin fronts. The machinery platform is supported on brackets beyond the line of the front posts.

The substructure for the dock consists of two rows of concrete pedestals supporting the columns, the pedestals in each row being united by a slab of concrete 4 ft. 6 in. thick by 19 ft. 3 in. wide, continuous for the length of the structure save for expansion joints every 48 ft. The slabs of the two rows of pedestals are joined at intervals of 24 ft. longitudinally by reinforced concrete ties 3 ft. wide and of the same thickness as the slab. Along the outside of the structure the slabs are thickened to form parapet walls 8 ft. 6 in. high. The bottom of the slab is 2 ft. below mean low water and the top of the parapet extends 6 ft. 6 in. above the water line. These parapets are extended on the inner side at the top by a concrete slab 9 in. thick to form a walk 9 ft. wide along the edge of the dock.

The concrete footing slab is supported on piles in transverse rows 3 ft. center to center, with 7 piles in each row in each half of the dock. As these piles stand in 24 ft. of water they are given lateral support by gravel-filled timber cribs of that depth.

REPLACES AN OLD WOODEN DOCK

The new dock replaces an old wooden dock which was located only 15 ft. to one side of the site of the new structure. As the location of the old dock had to serve as a slip for the new one it was necessary to remove it before the new dock could be placed in operation. The old structure which was



The Structural Steel Frame

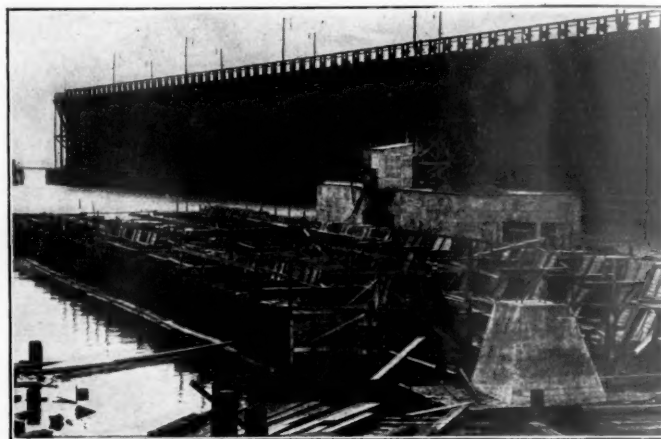
about 17 years old was about 1,850 ft. long, 52 ft. wide and 57 ft. high. Its foundation consisted of timber cribs and 6,500 piles.

The removal of the superstructure of the old dock, which contained about 5,500,000 ft. b. m. of timber, was accomplished by a stiff-leg derrick with a 40-ft. boom set on a 30-ft. truck traveling on the track deck and by large floating derricks in the slips alongside. The stiff-leg derrick removed all of the upper material and loaded it into cars. The scows dismantled the lower portion and rafted all the material which could be

reused in the new cribbing. This portion of the work began in December, 1915, and was completed about February 1, 1916. All of the old foundation had to be removed to permit the dredging of the slip to a depth of 22 ft. below mean water level. The piles were pulled by a scow pile driver with a lifting capacity of 85 tons. As these piles were too short for use in the new dock, they were placed in rafts, pulled on shore, and sawed into lumber. Although they ranged in age from 18 to 33 years, they proved to make good lumber and nearly a million feet board measure was reclaimed. The dredging was done by a 2-cu. yd. dipper dredge, about 50,000 cu. yd. in all being removed.

FOUNDATION FOR THE NEW DOCK

The new dock occupies the site of an old slip and was dredged to a uniform depth of 24 ft. so that the crib bottom



Construction Work on the Foundation

would be lower than any probable depth of water ever required in the slips on either side. After the dredging was completed and careful soundings had been taken to determine the accuracy of the work, the construction of the cribs was started. The latter, which were built in 250-ft. sections, were started with the first three courses adjusted to fit the bottom as determined by the soundings. After the side pieces had been launched, the ties were framed into the timbers already launched and then the fourth course was added. These lower courses were tied together by long bolts. In the following courses each timber was added and spiked separately, the crib being kept level at all times.

The outside walls of the crib consisted of solid 12-in. by 12-in. timbers but the intermediate tie walls both longitudinally and transverse were 10-in. by 12-in. open walls. As each section of the cribbing was completed it was towed into place, lined by four guide piles and sunk by the weight of a load of gravel placed on a platform on top of the top ties. This load of gravel was made sufficient to sink the cribbing about one foot into the lake bottom. Six of the 250-ft. sections of cribbing were required for the complete foundation.

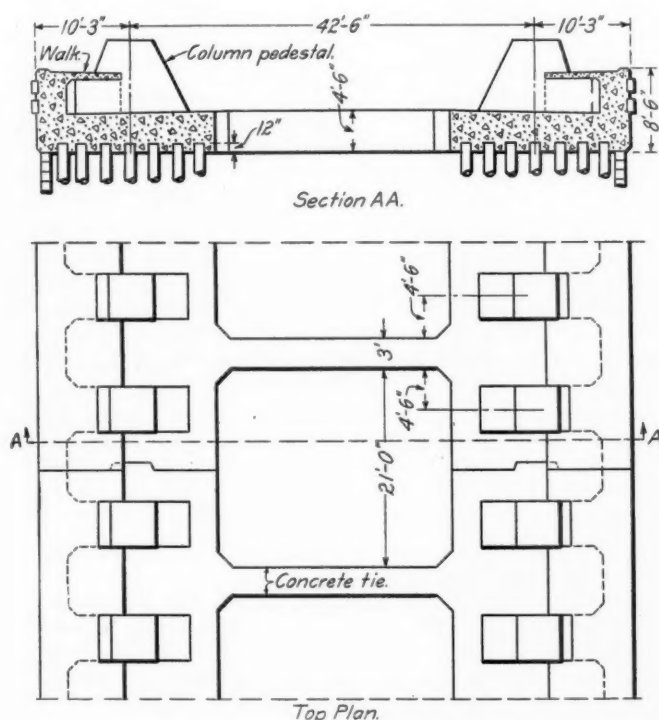
As soon as the cribs were in place, two swing drop hammer drivers with 3,800-lb. hammers, and 60-ft. leads began driving the bearing piles. The piles varied from 50 to 64 ft. in length and were of Norway, tamarack, spruce and a very few jack pine. The average daily performance for each driver was about 40 piles. The pile driving specifications called for a penetration of not over one inch per blow, for the last six blows, under a 40-ft. drop of a 3,000-lb. hammer, or its equivalent. The piles were cut off at a point one foot below mean low water with a circular saw, operated by a steam engine through a vertical shaft, on a swinging frame. As soon as the piling was ready the cribs were filled with gravel to within one foot of the pile cut off. Derrick scows handled the material for this filling from a nearby beach.

The concrete for the footing was supplied by a one-cubic

yard mixer mounted on a scow at a sufficient elevation to permit of spouting of the concrete to any part of the work. The concrete materials were supplied to the mixer by belt conveyors fed by hoppers erected on the scow, these hoppers being supplied with material by a small scow derrick. The maximum day's run for this plant was 280 cu. yd. in 10 hrs. In pouring the concrete the main slab was poured first, followed by the parapet wall, the walk and the piers to the top of the walk in turn, and lastly by the upper portion of the piers. The castings for the columns were set on the finished concrete without grouting.

CONSTRUCTION OF THE SUPERSTRUCTURE

The steel frame was erected with the help of a steel traveler with two 72-ft. steel booms each operated by a separate



Section and Part Plan of the Foundation

engine. The steel was unloaded as fast as it was received and reloaded on cars for delivery to the traveler on a track built on the dock foundation. All rivets were driven by eight pneumatic hammers averaging 3,500 rivets per day. The surface of all steel work not in contact with concrete or iron ore was given one coat of Illinois Steel Company Persian Gulf oxide paint.

The pre-molded slabs for the front and bottom of the bins were concreted in a slab yard about one-half mile from the dock. They were arranged in rows on either side of a track which served as a runway for a concreting plant mounted on a car. The concrete was delivered to the forms in spouts supported from a long boom and the stone and sand were delivered to the mixer in a small batch dump car from automatic dump measuring hoppers placed alongside the material cars. Cement and water were added from an elevated platform.

As the slabs are subject to a very severe service the wearing quality of the concrete is of great importance. The proportions of the mixture used was 1:1½:3 and great care was given in the finishing of the surfaces. Steel forms were used consisting of plates to which channels were riveted to form side walls. These forms insured slabs of a uniform thickness and even bearing on the steel work when erected. To facilitate the erection of the slabs which weighed about two tons, two 1½-in. nuts were embedded in the concrete for the reception

of the screw ends of eye-bolts, by means of which the slabs were lifted with a 25-hp. electric hoist. The work was done by a crew of nine men who erected as many as 78 slabs in a nine-hour shift.

The concrete for the partition and deck slabs was placed by a ½-cu. yd. mixer mounted on a flat car and fed from hoppers by a belt conveyor. The hoppers were supplied with material by a locomotive crane. With this equipment the concrete for two complete partitions or about 135 cu. yd. was ordinarily poured in a day. Sectional forms made of two-inch lumber were used for the partitions, each unit form covering about 50 sq. ft. The filled corners were made a part of these main form sections. These forms were handled about the work by an electric hoist.

OPERATING FEATURES

The operating arrangement of this dock is somewhat different than that of the others at Two Harbors. With good running ore one man can load a boat alone without difficulty. The doors for the dock are 7 ft. wide placed off center so that one edge of the door lines up with one partition, thus giving a straight discharge for one side of the pocket. A hopper corner shaped like a plow share is provided to deflect the ore from the other partition to the door. This style of partition was adopted as a result of tests which showed that it does away with much of the arching that takes place in the old center door pocket and is much more quickly operated. The doors weigh about 800 lb. each and are operated by hand hoists on the deck of the dock. They are counter-weighted so that there is only friction to overcome and they can be



The Concrete Slab Yard

operated against the flow of ore. The entire time consumed in opening and closing against ore is about 10 sec.

The spouts used are 7 ft. 4 in. wide at the dock end and 4 ft. 6 in. wide at the boat end with sides 2½ ft. deep and weigh 8,500 lb. They are 35 ft. long and are arranged to swing from an operative position 45 to 70 deg. below the horizontal to an idle position 70 deg. above the horizontal. The raising and lowering is accomplished by means of ¾-in. by 5-in. flat wire ropes connected to an individual hoist for each spout. These hoists are arranged in groups of 12 to be operated by a single motor but not more than two can be raised at a time.

Work on the cribs was begun in December, 1915, and the

first section was sunk in February, 1916. The pile driving was begun in March and the concrete foundation in April and the entire foundation was completed in July. The erection of the steel superstructure was begun in June, 1916, and was completed in October except for certain detail materials. The unit constructed slabs for the superstructure were concreted in May, June and July and were placed in October while the concrete partitions built in place were concreted in September, October and November. The concrete foundation involved 15,000 cu. yd. of concrete. The cribbing and tenders required 2,500,000 ft. b. m. of lumber, while 75,000 cu. yd. of gravel was required to fill the cribs and the superstructure required 10,000 tons of structural steel and 12,900 cu. yd. of concrete in partitions, decks, etc.

The Barnett & Record Company of Minneapolis, Minn., had the contract for the foundations complete. The American Bridge Company had the general contract for the fabrication and erection of the structural steel work. The superstructure concrete which was built in place was done by the Newton Engineering Company of Milwaukee, while the unit concrete was done by Strom Bros. of Two Harbors, Minn. The hoisting and operating machinery was furnished and installed by the Whiting Foundry and Equipment Company, Harvey, Ill.

This work was under the direction of W. A. Clark, chief engineer of the Duluth & Iron Range, and Leland Clapper, assistant engineer in direct charge of the work to whom we are indebted for the above information.

ELECTRIFICATION FOR STEAM RAILROADS*

By W. R. Stinemetz

Commercial Engineer, Westinghouse Electric & Manufacturing Co.

The Long Island was the first steam road to adopt electric power for the operation of suburban trains and it uses the same class of equipment and control, with the 600-volt third-rail, that is employed in elevated and subway lines. Multiple-unit car operation eliminated the unpleasant features of steam operation, such as smoke and cinders; it permitted great flexibility in making up trains of various sizes because of the ease with which additional motor cars and trailer units could be added; it relieved congestion at terminals by eliminating the switching formally required to make up trains, and faster schedules were permitted because of the rapid acceleration and the large power capacity, which is characteristic of motor-car trains. Suburban electrification has since been used by the New York, New Haven & Hartford between New York and New Haven, Conn.; by the New York Central between New York and Harmon, N. Y., and by the Pennsylvania at Philadelphia, all with marked success.

The first use of electric locomotives to haul trains was confined to restricted districts where it was necessary to eliminate smoke and gases in tunnels, such as in the Baltimore & Ohio tunnel under the city of Baltimore and in the various tunnels entering New York City. These installations also used 600-volt apparatus, which at that time was the only kind available. The question might naturally arise as to why the 600-volt system which has given such good service in tunnel, subway and elevated work is not universally practical. The reason is that, with such a low voltage, the large amount of power required for railroad service covering long distances and heavy grades would require such heavy currents that the expenditures for copper in substations and feeder systems would be excessive. This problem is the same as that involved in the transmission of electric power for industrial purposes, which never had extensive application until

a high voltage system was perfected. The higher the voltage the lower the current for the same horsepower and the lower the current the less the amount of copper required for the lines and sub-station apparatus. The voltage can be too high, however, as the increased cost of insulation at the higher voltages soon balances the saving in copper.

Another reason why the low pressure system is not considered adaptable to all railroad conditions is the fact that, with this system, the third rail is necessary to collect the amount of current required. Practical railroad men realize that the third rail is not a particularly desirable addition to the trackage system, especially where the tracks are congested, as in terminals and yards.

The experience gained from the operation of the earlier low voltage installations, together with the clearer realization of the requirements obtained from actual contact with railroad operation, made evident the necessity for high voltage systems if the large power requirements for heavy grade haulage and long distance distribution for main line extensions were to be economically met. The high voltage idea was first successfully applied to the single-phase alternating current system as used on the New Haven's complete four-track division between New York and New Haven, Conn. It has been followed by the development of the high voltage direct-current system inaugurated recently on the Chicago, Milwaukee & St. Paul, embracing three single track divisions. A modification of the high voltage single-phase system is that used by the Norfolk & Western on its Elkhorn grade electrification. This system involves the use of a high voltage, single-phase overhead contact wire with three-phase motors in the locomotive. One of the most important factors in making possible the use of the higher voltage in both the alternating and direct-current systems has been the great advance made in the design of overhead contact lines. This has been accomplished by the introduction of the catenary type of suspension with steel poles or bridges, together with the improvements in the current collection devices; all of which permit safe and efficient operation over a wide range of speed.

In the period which has elapsed since the advent of the electric locomotive electric traction engineers have also learned a great deal about steam railroading. They have come to appreciate and respect the problems involved in the quick and safe despatch of freight and passengers. They have also learned that, to a great extent, the railroads own operating methods, developed during years of experience, are the best. They have found out that on a busy railroad system, it is not feasible to relieve congestion gradually or to regulate despatching so as not to overload the power house, line and substations. The line and substations are therefore designed to meet the peak conditions by having large overload capacities. The present tendency in the operation of multiple unit trains is to make all cars motor cars so as to avoid the possibility of overloading by making up trains with an excessive proportion of trailers. With locomotives the problem has been harder. The steam locomotive is a self contained mechanical unit and it is hardly possible to injuriously overload it. The electric locomotive is a piece of transforming apparatus which receives its power from an outside source and it is, therefore, subject to overloads.

The different methods used in rating electric and steam locomotives have frequently caused misunderstandings. The rating of the steam locomotive is shown by a curve plotted with draw-bar pull against speed. Such a curve is based on the consumption of a specified amount of coal and water per hour to maintain this power. The problem is purely a mechanical one, and the curve represents the maximum capacity. If the locomotive will meet these conditions once, it will do it any number of times and for indefinite periods. The capacity of the electric, on the other hand, is limited by the heating of its motors. This heating must be kept within safe limits to prevent injury to the insulation, just

*Abstract of paper read before the New England Railroad Club, February 14, 1917.

as the water in a steam locomotive must be kept at a safe level to prevent injury to the boiler. The heating is proportional to the amount of current and the length of time the current is in the motors. It is therefore, possible, provided the motors have not already reached their maximum temperature, to subject them to overloads for short periods, which additional power capacity is advantageous in taking the train over short ruling grades. It is necessary, therefore, to give the electric engine two ratings—one representing the draw-bar pull which it will exert continuously and another rating, perhaps 25 per cent higher, which it will exert for short periods of less than one hour. The fact that an electric locomotive can pull a load much greater than its rating, does not mean that sufficient care should not be exercised to see that this does not lead to abuse. If it is subjected to excessive temperature frequently, the inevitable result will be rapid deterioration of the insulation with an eventual burn-out, resulting in delays and high maintenance cost. Such failures do not always happen when the locomotive is excessively overloaded but may show up later, when the engine is again in normal service. It is, therefore, often difficult to locate the responsibility.

There is an analogy between the steam passenger locomotive and the electric passenger locomotive as regards overload capacity which appears pertinent. This class of steam locomotive does not use the mechanical stoker, and therefore its maximum rated capacity depends on the ability of the fireman to shovel the required amount of coal into the fire box. As a rule the speed draw-bar pull curve representing this capacity is based on a high rate of coal, perhaps, 11,000 to 12,000 pounds per hour. I believe it would take a very exceptional man to shovel coal at this rate for any length of time, and that his average on a run would be more in the neighborhood of 6,000 pounds of coal. We, therefore, have the sustained capacity of the engine in one case, limited by the endurance of the fireman, and in the other case by the heating of the motors. As a matter of fact, the load rating of the steam engine is made such that the engine will be pulling the train on the level stretches with a coal consumption of perhaps 5,000 to 6,000 pounds per hour. The fireman, as he approaches a short grade section, will then bring his fires into top condition, and when he hits the grade, shuts off his feed water and gives the engine her maximum output. The electric engine should be operated in a similar manner, by so adjusting the load rating that on level track it will operate well within its continuous capacity, and the overload of the grade will not cause excessive temperature rises in a short time.

During these years, the visions of the electrical engineers of eliminating the steam locomotive, have met with one very disturbing feature, and that is that just when they think they have something better, the steam locomotive comes back bigger than ever. I think that you will all admit, however, that since the introduction of the electric locomotive the steam locomotive has been made a much better machine. The modern locomotive, by the use of brick arches, feed water heaters, superheaters and stokers, has had its efficiency increased in the neighborhood of 50 per cent, while at the same time its size and capacity have taken wonderful jumps.

With all this advance, the question often arises as to wherein the electric locomotives are superior. From an operating standpoint it has a number of minor advantages. It eliminates the turn table; cuts down stand-by losses; removes the delay at water tanks and coaling stations; its availability for service is very much greater, and its maintenance is considerably lower. Its capacity is increased with cold weather—the reverse of the steam engine. Its simplicity of control relieves the crew from many duties necessary on a steam engine, and permits closer observation of track and signals. When properly designed, it is much easier riding and can have a more uniform distribution of weights with less nosing

and track pounding; all of which tend to lower track maintenance. In addition there is one great inherent advantage which the electric locomotive possesses, namely, the ability to concentrate large amounts of horsepower under single control. This may be in a single cab, or the locomotive may consist of semi-units permanently coupled. It can have as many motor driven axles as the track structure will permit.

The concentration of horsepower capacity is, of course, possible, only because the engine is not a self-contained unit, but receives its power from an outside central supply source delivered through the contact wire. This point was very well brought out lately by a road foreman of engines, who, in examining a large electric freight locomotive, said that what appealed to him was that all he had to worry about after getting the train started was the signals ahead, as the engine would haul his load at 14 miles per hour up hill and down, as long as the power house fed the power into the line. He seemed to feel that the great responsibility of supplying power to his engine under all kinds of adverse conditions had removed the greater part of his burdens.

This concentration of horsepower is utilized in the form of speed which will eliminate the congestion due to handling heavy freight traffic over heavy grade divisions, with Mallet engines operating at only seven miles per hour. I think this point can best be illustrated by referring to the Norfolk & Western operation where three Mallet locomotives, having a combined weight on the drivers of 510 tons with a total weight of 860 tons, were required to haul a 2,900-ton load over the grade section at seven miles per hour. This load under electrification was increased by 320 tons and handled by two electrics having a combined weight on the drivers of 440 tons, with a total of only 540 tons, and at double the speed, or 14 miles per hour. This shows that the excess of 320 tons locomotive weight with the Mallets was transferred to draw-bar tonnage in the use of electrics without increasing the total tonnage of the train. When hauling these loads up the 2 per cent Elkhorn grade the two electrics deliver 5,300 draw-bar horsepower as against 2,400 draw-bar horsepower for the three Mallets, or an increase of 120 per cent. The increased running speed, together with the elimination of delays, due to taking coal and water, at which times considerable additional time is often lost in getting the train in motion, has so relieved congestion that eight electric locomotives are now doing the same work which formerly required 24 Mallets.

I might ask in conclusion, what will cause steam roads in the future to electrify? We have seen that in the past some electrifications have been compulsory—made so by legislation. Some have been made to improve the poor operating conditions in tunnels due to smoke and gases; others to overcome terminal congestion. The availability of cheap electric power, as against the high cost of coal, as well as the fact that purchased power eliminates the initial investment for power house, is a large factor in the West. It seems reasonable to suppose that the steam railroads will consider electrification favorably, when the reduction in operating expenses will pay the interest on the necessary investment, leaving the unevaluated advantages to be gained by electric operation as an additional asset. Also, when the traffic on the system has reached a point where further trackage capacity is imperative and this can only be supplied by a large additional expenditure or by electrifying.

CARS COLD IN GERMANY—According to press despatches, the German railway authorities warn travelers to wear warm clothing, not only on long journeys, but also when using the Berlin local railways, as they cannot guarantee the trains being heated. The reasons assigned are the heavy demands on the railway administration for the delivery of locomotives in the enemy territories occupied and the necessity for the installation of heating apparatus on hospital trains.

NATIONAL DEFENSE COMMITTEE OF THE AMERICAN RAILWAY ASSOCIATION

The executive committee of the American Railway Association, at a meeting in New York City February 16 established four district committees, Eastern, Central, Southern and Western, to co-operate with the officers of the federal government in connection with the work of the Council for National Defense; and the chairmen of these four committees, with Fairfax Harrison, president of the Southern Railway, as general chairman, will constitute a special executive committee for this work. Mr. Harrison, it will be remembered, was chairman of the special committee of this association co-operating with the military authorities in connection with the transportation of troops to the Mexican border last year; and his office is in Washington where he can be in close touch with the President and the war department.

This action of the association is taken in response to a request which comes through President Daniel Willard of the Baltimore & Ohio, who is chairman of the Committee on Transportation and Communication of the Advisory Commission of the Council for National Defense. The four committees correspond to each of the four military departments of the country, and they will maintain headquarters in the cities that are the military headquarters of their departments. The chairman of each was selected partly because of the location of his office in such a city. In announcing the formation of these committees and its undertaking the Executive Committee of the association adopted the following resolution:

"Whereas, The President of the United States has appointed a National Council for Defense for the purpose of ascertaining the resources of the country and of securing the co-operation of all organized transportation and industrial activities in furtherance of this purpose,

"Resolved, That in order that the railways may be in a position to assist with their full strength . . . that fourteen members be added to the [present] special committee so as to constitute a committee of eighteen members. . . ."

W. W. Atterbury at once telegraphed to the president of each railroad in the association in part as follows:

"President emergency calls for loyal support and earnest co-operation by railroads. To assure this to fullest extent, executive committee has enlarged the special committee on co-operation with military authorities and designated it Special Committee of American Railway Association on National Defense, consisting of eighteen members. . . . Executive Committee requests the hearty co-operation of each member of association."

The personnel of the various committees follows: Fairfax Harrison, president Southern Railway, general chairman.

For the Eastern Department: L. F. Loree, president, Delaware & Hudson, chairman; W. G. Besler, president, Central of New Jersey; A. W. Thompson, vice-president, Baltimore & Ohio; A. H. Smith, president, New York Central; J. H. Hustis, receiver, Boston & Maine; W. J. Harahan, president, Seaboard Air Line.

For the Central Department: R. H. Aishton, president, Chicago & North Western, chairman; G. L. Peck, vice-president, Pennsylvania Lines West of Pittsburgh; E. E. Calvin, president, Union Pacific; C. H. Markham, president, Illinois Central; G. T. Slade, vice-president, Northern Pacific.

For the Southern Department: W. B. Scott, president, Southern Pacific Lines in Texas and Louisiana, chairman; B. F. Bush, receiver, Missouri Pacific; C. E. Schaff, receiver, Missouri, Kansas & Texas.

For the Western Department: William Sproule, president, Southern Pacific, chairman; E. P. Ripley, president, Atchison, Topeka & Santa Fe; J. D. Farrell, president, Oregon-Washington Railroad & Navigation Co. The whole committee of 18 will meet soon at Washington to tender their services formally to President Wilson.

NEW RAILWAY CAPITAL IN 1916

The Bureau of Railway News & Statistics has issued the following:

"New capital absorbed in improvements and extensions of American railways in 1916, as measured by an analysis by the Bureau of Railway News & Statistics, Chicago, of listings on the New York Stock Exchange, fell to approximately \$64,000,000, less than in any previous year of the present century. Being under one-fifth the amount of new capital listed in 1913, about one-fifth that listed in 1914 and two-thirds that listed in 1915, the year's poor showing marks the culmination in diversion of capital from the railway industry to war-stimulated undertakings. Coming on the heels of the 1915 receiverships, and the coincident slowing down in expansion it has left the carriers with inadequate facilities to shoulder the suddenly enlarged traffic demands. In thousands, listings for the last three years compare as follows:

Security Listed	1914	1915	1916
Railway bonds—			
For new construction.....	\$238,377	\$ 78,624	\$ 57,031
To exchange or retire old issues.....	106,607	247,031	231,698
Total bonds	\$344,984	\$325,655	\$288,729
Railway stocks—			
For new construction	\$ 64,854	\$ 12,911	\$ 7,070
To exchange for other issues, receivers' certificates, etc.	281,162	354,917	154,116
Total stocks	\$346,016	\$367,828	\$161,186
Total stocks and bonds.....	\$691,000	\$693,483	\$449,915
Total new money.....	303,231	91,535	64,101

"Of railway bonds listed, totalling \$288,729,500, almost \$232,000,000 were to exchange or retire old issues, barely \$57,000,000 being designated as for new construction, improvements, etc. Comparison shows a marked contrast, in 1915 \$78,624,500 being for new construction against \$247,030,600 for refunding, while in 1914 bonds for new money totalled \$238,376,800 against only \$106,607,000 for refunding. Stocks show the most significant aspect of the analysis, those sold for new money for additions and betterments falling to only \$7,070,000 in 1916 out of a total of \$161,185,600, against \$12,910,570 in 1915 (out of \$367,827,670) and \$64,853,700 in 1913 (out of \$346,016,100).

"Stocks represented only 11 per cent of the new money secured in 1916, as shown by listings, and only 14 per cent in 1915; whereas they represented 21 per cent in 1914 and 60 per cent in 1913. Conversely bonds represented 89 per cent of the new money in 1916 against only 40 per cent in 1913. Herein is reflected vividly the increasing difficulty of securing new railway capital through sale of stocks, with the dangerous consequences of an overproportion of mortgage bonds, over-heavy fixed charges and perils of receiverships.

"Combining stocks and bonds issued for new construction, improvements, etc., the total of listed capital devoted in 1916 to enlarging the railway plant to keep pace with the nation's growing requirements reached only \$64,101,500, against \$91,535,070 in 1915, \$303,230,500 in 1914 and \$341,599,850 in 1913. That year had the largest total to date excepting only 1909, when the aggregate was \$597,243,112 in stocks and bonds listed as new money devoted to improvements and extensions. Railway listings in 1916 were completely overshadowed by those of the industrial corporations, as might be expected from the tremendous expansion of manufacturing plants for production of our unprecedented exports and to meet enlarged home consumption on the crest of vast incoming wealth. Railway securities were only 29.5 per cent of all listed in 1916, against 46.8 per cent in 1915 and 65.1 per cent the year before. Railway stocks were only 16.7 per cent of all stocks listed, but railway bonds were 51.6 per cent of all bonds listed, showing again the increasing difficulty of securing new railway capital except on the security of a mortgage. The preponderance of bonds is exclusive of \$68,556,400 in short term notes issued, at current rates of interest, to tide over financing to some more favorable opportunity."

A Proposed Consolidation of Canadian Railroads*

Unification and Private Control of Transcontinental, Grand Trunk Pacific, Can. Northern and Grand Trunk

By William F. Tye,

Formerly Chief Engineer of the Canadian Pacific.

CANADA may be compared with the Siamese twins—two bodies, the East and the West, commercially united by a narrow ligature—the railways. The long stretch of country extending from about Sudbury, Ont., to near Winnipeg, Man., a distance of nearly 1,000 miles, is practically barren as far as local traffic is concerned, and a big drag on the railways' earnings. Each of the two bodies—the East and the West—is very large in size, and, as yet, sparsely settled. So the railways in each body have a somewhat thin traffic local to themselves, and in addition the transcontinental lines have a through traffic from one to the other, which must be carried across unproductive territory. It is thus necessary that any railway connecting the two bodies have an extensive system in each, not only in order to get its fair share of the traffic in each of the two bodies, but also to gather traffic in one to carry to the other, to enable it to pay the cost of operation on the long unproductive stretch through northern Ontario.

The Grand Trunk is entirely local to the East. It has been expensively constructed and financed. It has been controlled from London, a point too far away for effective control. It has had no opportunity to take part in Canada's greatest development which has gone on in the West, and has, therefore, been only moderately successful.

The Grand Trunk Pacific and the Transcontinental, which really form one system, have been built without any regard to the principles which underlie the economies of railway location and construction. The first essential for any railway is that it get traffic, as without traffic it cannot live, no matter how cheaply or inexpensively it be built, and this cannot be had without an extensive system of feeders. These two roads spent large sums in building main lines far in advance of their present requirements, and very little on feeders or branch lines. The result is 3,550 miles of very expensive main lines, and only 1,200 miles of branch line feeders,—fixed charges equal to gross earnings, and a cost on each railroad of about \$200 to do \$100 worth of business.

The Canadian Northern was built, first as a western road, and while it remained purely a western road, was very successful, but it, too, built a long, expensive line across the unproductive country between Montreal, Toronto and Winnipeg, without, at the same time, building an adequate system of feeders and terminals in the East with which to gather traffic for the West, and to support the long unproductive mileage in northern Ontario.

The Intercolonial's troubles have been those inherent in all government management,—excessive cost of construction, expensive management, and low freight rates.

SUGGESTED REMEDIES

To remedy these matters many different suggestions have been made. These may be summarized as follows:

1. Transferring the Canadian Northern, the Grand Trunk Pacific and the Transcontinental to the Canadian Pacific.
2. Government ownership of some, or all, of these railways.
3. Aiding the Canadian Northern and the Grand Trunk Pacific railways until such time as they become profitable.
4. The remedy which the writer advocates,—consolidation of the Grand Trunk, the Grand Trunk Pacific, the Trans-

continental and the Canadian Northern in one system, under a new company to be formed.

The first of these, viz., disposing of the Canadian Northern, the Grand Trunk Pacific and the Transcontinental to the Canadian Pacific might be an ultimate financial success, provided that company was willing to assume the risk, but it is open to the fatal objection that it would do away with all competition, which is absolutely necessary in any business.

It does not seem possible that any one who has given serious thought to the matter can be in favor of government ownership of such an extensive system, more especially in a country so dominated by politics as is Canada. One can easily imagine what the result would be. Before the first election a cry would go up for lower rates, which the politicians, to suit their needs, would grant. This would result in deficits such as have been so common on the Intercolonial. These deficits and the fixed charges would have to be met by taxation. The Canadian Pacific would have to meet the government rates, which would surely result in the bankruptcy of that road, or in its being taken over by the government.

If all the roads were nationalized the cost would be far too much for the country to finance. There would be an entire lack of competition which is disastrous to any business, and there would be a lack of continuous management, as each party, as it attained power, would want to reward its own politicians by giving them the best positions on the railways, and the best men would not be selected. The large army of government appointees necessary to run such a great mileage would be a grave danger to the purity of our elections.

CANADIAN EXPERIENCE IN GOVERNMENT OWNERSHIP

Our experience in government-managed railways in Canada has not been such as to justify us in such a gigantic addition to our public responsibilities. We now have five government-owned roads in Canada, and not one of them has earned interest on its cost, and only one (the Temiskaming & Northern Ontario) has earned its operating expenses.

The Transcontinental was built by a commission without experience in the construction or operation of railways. The Stanton-Gutelius commission appointed to investigate its construction, shows that its cost to 1914, exclusive of any rolling stock, amounted to \$99,500 per mile. At the same time this road was being constructed, the Canadian Northern built a parallel road for exactly the same purpose, viz., to connect the eastern and western systems. The road is in every respect as efficient an instrument of transportation as is the Transcontinental, and its cost certainly did not exceed \$50,000 per mile. The Quebec bridge is a link in the Transcontinental system. With the necessary approaches it has cost \$40,000,000 and was decided on and built without any consideration as to its economic value. Train ferries, which could have been built for a small fraction of its cost, would have served every purpose for many years to come, and would have taken the traffic directly through Quebec, much to that city's advantage.

It is quite safe to say if the Transcontinental, including the crossing of the St. Lawrence river, had been built by the Canadian Pacific, its cost would have been at least \$100,000,000 less than as built by the Dominion government.

The Intercolonial is the most extensive public-owned system

*Abstracted from a paper read before the Canadian Society of Civil Engineers on January 18.

on the Continent. In the year 1913 (which was a very favorable one for the Intercolonial) it cost the owners of this road—the people of Canada—including interest on the cost, \$25,832,136, to earn \$12,349,296, while it cost the owners of the Canadian Pacific (the shareholders) \$90,562,161, to earn \$129,481,885. In other words, on the Intercolonial, it cost \$209 to do \$100 worth of business, while on the Canadian Pacific it cost \$70 to do \$100 worth of business.

The justification put forward for this remarkable state of affairs is that the Intercolonial was built for political purposes to bring the maritime provinces into the confederation, and any attempt to make the road pay would be looked upon as breaking faith with the people of the maritime provinces, who look upon the Intercolonial as an offset to the canals in the upper provinces, which are operated without any tolls. It must not be forgotten that the Canadian Pacific, too, was built for a political purpose, to bring British Columbia into the confederation, and it has been as great a financial success under private management as the Intercolonial has been a failure under government management.

Whether the reasons advanced for the failure of the Intercolonial be sufficient or not, they certainly do not apply to the western roads, and there are no similar questions to complicate the problem of how best to dispose of the transcontinental lines. While Canada has been rich enough to stand such wasteful and extravagant methods, when applied to a small road like the Intercolonial, it could not possibly stand them when applied to the huge transcontinental systems.

PROPOSED CONSOLIDATION

The remedy which the writer proposes for this state of affairs, and the only one which he believes has any hope of success, is to combine the Grand Trunk, the Grand Trunk Pacific, the National Transcontinental and the Canadian Northern under one company. Canada now stands at the parting of the ways, just as she did in 1879. The grave question then at issue was whether the Canadian Pacific should be constructed and managed by the government, or by a private corporation. No one looking at the question can now fail to be struck by the wisdom displayed by Sir John MacDonald, when he decided that the road should be turned over to a private corporation.

It should be no more difficult to get a private corporation of the very best class to take over our present roads, than it was for Sir John MacDonald. The present conditions are much more favorable. At that date neither the Canadian nor the American Northwest had been proved to be capable of supporting a large population. So far, western Canada has hardly been scratched. In 1906, the whole grain output came from an acreage of less than five per cent of the area within five miles of the Canadian Pacific lines, and at the present time it comes from an acreage of less than 10 per cent of the arable land in the three prairie provinces.

The consolidation could not hope to be financially successful at first, as the net revenue could not possibly be sufficient to pay the fixed charges and a series of deficits are sure to result. These deficits, I believe, would not extend over a period of more than 8 or 10 years at the most.

The necessary capital should be raised by an issue of common stock, with a guarantee of five per cent interest for 10 years by the Canadian government, the amount guaranteed being limited to, say, \$200,000,000. The legislation constituting the company should be on the same lines as that which constituted the Canadian Pacific, that is, it should be an actual contract between the government and the company, setting forth in detail the respective rights of each party. One of the clauses in this contract should be (as was in the Canadian Pacific contract) that until such time as the company was earning 10 per cent on the actual cost to it of the road, equipment, etc., the government should have no right to regulate rates.

As the various governments, dominion and provincial, have guaranteed most of the cost of the lines forming the proposed combination, they should be willing to agree to these terms, as if the company could not meet its fixed charges, the government would have to meet them.

The situation has arisen owing to the unwise policy of duplication of lines, encouraged and bonused by the government, and to its extravagance in construction. If there is a penalty to be paid for the indulgence in this policy, the country must be the one to stand it. It is sure and certain, if the government nationalizes the roads and assumes the management, that the deficits will be many times as great as if the roads be operated by a private company, and in this event the deficits would have to be met by the government. Canada should be well satisfied to get out of this mess by paying deficits (if such there be) for a few years. It is quite in line with what we have been doing ever since confederation, first of all, giving money and land, then money only, and lately, and worst of all, guaranteeing bonds for the construction of railways.

A new company sufficiently strong to finance such a consolidation should be formed to take them over. In this new company the government should have a 40 per cent interest, should own 40 per cent of the stock, furnish 40 per cent of the money, have 40 per cent of the directorate, should have an active voice in the policy, but should not have any say in the actual management of the road. This would give the government a direct voice in the policy of the road; would enable it to mould its future, and would give all the benefits, without any of the evils, of government ownership.

HOW ROADS WOULD BE CONNECTED

If such a combination were made the roads should be connected in several places. The most important would be in northern Ontario, at some point east of Lake Nepigon, probably from the north end of Long Lake on the Canadian Northern, to a point near Titania on the Transcontinental. This connection would give the shortest and most direct route from Winnipeg to Montreal and Toronto. The roads would also have to be connected at Yellowhead Pass where they are side by side; at Montreal; at some point, say, Napanee on the lines between Toronto and Ottawa, and, no doubt, at many points on the prairie.

The main line would then be the Grand Trunk Pacific and the National Transcontinental from Prince Rupert to Quebec and Moncton; the Canadian Northern from Vancouver to Yellowhead Pass; the Grand Trunk Pacific from Yellowhead Pass to Winnipeg; the National Transcontinental from Winnipeg to Titania; a new line to be built from Titania to Long Lake and the Canadian Northern from Long Lake to Montreal.

From Toronto to Ottawa the Grand Trunk would be used from Toronto to, say, Napanee, and the Canadian Northern from Napanee to Ottawa. The various main lines of the Grand Trunk would remain the same.

PHYSICAL ADVANTAGES OF CONSOLIDATION

Such a combination would have a first-class system in Ontario and the East, reaching every important center; a main line to Chicago, with good local branches in Michigan; a main line to Portland (the natural winter port of Canada)—the shortest line to St. John and Halifax (the two Canadian winter ports); a good connection with the New England States by way of the Central Vermont; a very good local system in the prairie provinces,—Manitoba, Saskatchewan and Alberta, and, by far, the best line across the mountains connecting the Pacific ports with the prairie provinces.

There are many advantages which would be had from the consolidation which cannot be had separately. The following table gives the mileages from different points in the East to Winnipeg and Vancouver, showing how the distance can be reduced below similar distances on the individual roads, and

how the new mileage will compare with the Canadian Pacific. Between St. John and Winnipeg, a new line down the St. John Valley would be necessary to get the reduction in distance if such a connection were found to be desirable.

Railway	Montreal to Winnipeg	Toronto to Winnipeg	Quebec to Winnipeg	Halifax to Winnipeg
Canadian Pacific	1,411.6	1,272.3	1,563.4	2,157.2
Canadian Northern	1,455.7	1,312.5	1,607.5	.....
Grand Trunk	1,425.0	1,255.9	1,350.3	1,990.7
Grand Trunk Pacific	1,425.0	1,255.9	1,350.3	1,990.7
National Transcontinental	1,425.0	1,255.9	1,350.3	1,990.7
Proposed Consolidation	1,347.7	1,204.5	1,350.3	1,990.7

Railway	Winnipeg to Vancouver	Montreal to Vancouver	Toronto to Vancouver
Canadian Pacific	1,483.5	2,895.1	2,715.8
Canadian Northern	1,599.7	3,055.4	2,912.2
Grand Trunk	1,760.6	3,185.6	3,016.6
Grand Trunk Pacific	1,760.6	3,185.6	3,016.6
National Transcontinental	1,760.6	3,185.6	3,016.6
Proposed Consolidation	1,555.9	2,903.6	2,760.4

The grades on the main lines of the new consolidation from Montreal, Toronto and Quebec to Winnipeg and Vancouver would be very unusual for such a length of line, and one through so many hundreds of miles of mountains. From Edmonton to Montreal, Toronto and Quebec, there would be no grades steeper than 0.4 per cent against eastbound, and 0.6 per cent against westbound traffic, while from Edmonton to Vancouver there would be no grades steeper than 0.7 per cent against the eastbound, and 0.4 per cent against westbound traffic. The main lines, as now constructed, have many miles of one per cent grades, or steeper.

The new consolidation would have the shortest line, and the best grades from all such points as Halifax, St. John, Portland, Quebec, Montreal and Toronto to Winnipeg. It would also have a shorter line, with much better grades than either the present Grand Trunk or Canadian Northern between Winnipeg and Vancouver, and while the Canadian Pacific would be eight miles shorter from Montreal to Vancouver, and 45 miles shorter from Toronto to Vancouver, the new route would have decidedly better grades, no snow-slides, much less rise and fall, and would require less train-miles in its operation.

The National Transcontinental and the Grand Trunk Pacific, as now built, consists of a main line 3,550 miles long, with only about 1,200 miles of branches. While the old Grand Trunk and the Intercolonial furnish this route with good feeders in the East, it is absolutely essential if it is to be made to pay as an independent line, that at least 5,000 to 6,000 miles of feeders be built in the West. It is practically impossible to build such a system of feeders without cutting deeply into the territory now served by the Canadian Pacific or the Canadian Northern. Such a duplication of lines would be absolutely useless as far as Canada, as a whole, is concerned.

The Canadian Northern, on the other hand, has a very meagre system of badly placed branches in Ontario and Quebec, and if it is to be a success as an independent road, it must have such a system, which can only be had by duplicating and paralleling the Grand Trunk or the Canadian Pacific, as, for instance, the useless duplication of lines along the north shore of Lake Ontario, and the duplication, by the proposed Canadian Northern, from Toronto to Niagara, of the existing lines. It is also essential, if it is to have an outlet for its winter business, that it reach a winter port,—which it does not.

Terminals in Montreal, Toronto, Ottawa and Quebec are, for an independent Canadian Northern, an absolute and very expensive necessity, all of which can be avoided by a combination with the Grand Trunk. The Grand Trunk Pacific has a well-built main line, but practically no branches, nor any place to put them. The Canadian Northern has many thousands of miles of branch lines in the West, but no proper main line. Each line is thus strong where the other is weak,

and it will, therefore, cost the least possible amount for new construction and betterments to combine the two.

FINANCIAL PROBLEMS OF A COMBINATION

When the combination went into effect it would have better main lines than the Canadian Pacific, and have a decidedly better system in Ontario and Quebec than that road. It would have about 6,500 miles of branches in the prairie provinces, as compared with about 5,300 miles of branches owned by the Canadian Pacific. These branch lines are not so well placed as are those of the Canadian Pacific, but, nevertheless, they make a fairly comprehensive system. It would have good terminals in Quebec, Montreal, Toronto, Portland, Ft. William, Port Arthur and Winnipeg, and all other important points, except Vancouver. It should thus be well equipped to get its share of the business, but would, on the other hand, find itself face to face with certain large expenditures which would have to be made in the near future.

The greatest drawback to the immediate success of the proposed consolidation is the excessive cost of construction of the National Transcontinental and the Grand Trunk Pacific, and to the policy of duplication of lines persisted in by the companies, and encouraged by the government by guarantees of bonds, etc. The fixed charges which must be met are, therefore, very high, amounting, as they would for the proposed combination, to about \$35,000,000, as compared with \$10,306,196 on the Canadian Pacific.

The mileage of the combined roads would be as follows: the Grand Trunk, 4,792; the Grand Trunk Pacific, 2,755; the National Transcontinental, 1,993, and the Canadian Northern, 9,481, making a total of 19,021 miles. Such a combination should be an ultimate success under proper management.

The factors which would determine its success or failure are: gross earnings at the time of consolidation; probable increase in gross earnings; additional money requirements; the operating ratio, and fixed charges. In view of the fact that the average operating ratios of the different Canadian railways over a period of 10 to 12 years have been: the Canadian Northern, 69.50 per cent; the Canadian Pacific, 65.88 per cent; the Grand Trunk, 75.95 per cent, and the whole Canadian system of railways, 71.4 per cent, it seems reasonable to assume that for the first three years the operating ratio should not exceed 75 per cent and after that 70 per cent.

Much money would be required by the new consolidation. The amount would depend, to a great extent, on what terms could be made with the Grand Trunk shareholders. Both the Canadian Northern and the Grand Trunk Pacific are practically bankrupt and their common stock is at present valueless. The government should take them both over, giving a small amount of stock in the new consolidation to the shareholders, and then turn the roads over to the new company on the same basis. The Grand Trunk is, however, in a different position. It is earning much more than its fixed charges, and its share capital would have to be acquired.

The total present value of the stock is \$71,105,973. From 1910 to 1915 the Grand Trunk has paid dividends on this stock amounting to an average of \$3,465,360 per annum, the maximum being \$4,707,812, and the minimum \$2,130,625. It might be that the shareholders would be satisfied to take preferred stock, or some other form of securities in the new consolidation, in exchange for their present securities. In any event, \$85,000,000 should be an amply large valuation.

It is, of course, impossible, without a detailed examination, to make even an approximate estimate of the money requirements to put these roads in proper shape. If the proceeds of the \$85,000,000 new common stock sold at par was sufficient for the Canadian Pacific for seven years, at a time when it was in much worse physical condition than the Grand Trunk, the Grand Trunk Pacific and the Canadian Northern railways are on the average, then \$100,000,000 ought to be

amply sufficient for the proposed consolidation for four or five years, or until such time as it would be financially on its feet.

If it were found necessary to acquire the total share capital of the Grand Trunk, the money requirements would be, to acquire Grand Trunk stock, \$85,000,000; and improvements and betterments to be spread over, say, five years, \$100,000,000,—making a total of \$185,000,000.

The total fixed charges at the time the consolidation went into effect (according to carefully worked out calculations by Mr. Tye which have been omitted for want of space—Ed.) would be:

Grand Trunk	\$10,141,183
Grand Trunk Pacific	6,811,834
Canadian Northern	13,400,000
Interest on cost of Grand Trunk (\$85,000,000 at 5 per cent)	4,250,000
Total	\$34,603,017
To which would be added after seven years—	
Rental, National Transcontinental	\$5,400,000

PROSPECTS FOR THE CONSOLIDATION

The conditions under which the consolidation would commence business would be as follows: The gross earnings should not be less than \$100,000,000 (they actually were over \$110,000,000 in 1916). The increase in gross earnings should not be less than eight per cent per annum. The sum of \$85,000,000 should be sufficient to buy out the Grand Trunk. The expenditure of \$100,000,000 spread over five years should be sufficient to put the consolidation in first class physical condition, and to provide sufficient rolling stock. It should be possible to raise the necessary \$185,000,000 with a guarantee of interest by the Canadian government on a five per cent basis. It should be possible to make an arrangement with the government, similar to the one it made with the Grand Trunk Pacific, that no rental be charged for the Transcontinental for seven years after consolidation. The operating ratios should not exceed 75 per cent for the first three years, and 70 per cent thereafter. The Grand Trunk net revenue from other sources should continue to be as large as it has been on the average for the last three years for which figures are available, viz., \$2,814,300. Fixed charges should not, at the time of consolidation, exceed \$34,600,000.

If all of these assumptions are conservative (and they appear to be) the average financial results for the first eight years would be as follows:

Gross earnings of roads at consolidation	\$100,000,000
FIRST YEAR	
Total gross earnings	\$108,000,000
Operating ratio, 75 per cent	
Net earnings, 25 per cent	\$27,000,000
Fixed charges at consolidation	\$34,600,000
Interest at 5 per cent on \$20,000,000 to be expended	1,000,000
Total fixed charges—first year	\$35,600,000
Operating loss	\$8,600,000
Less: Net revenue Grand Trunk	2,814,300
Deficit	\$5,785,700
EIGHTH YEAR	
Total gross earnings	\$185,120,000
Net earnings, 30 per cent	\$55,536,000
Fixed charges	\$39,600,000
Rental National Transcontinental	5,400,000
Total fixed charges	45,000,000
Operating gain	\$10,536,000
Net revenue Grand Trunk	2,814,300
Surplus	\$13,350,300

If the operating ratio should not be better than 73 per cent after the third year, there would still be a surplus of about \$1,000,000 in the fourth year, and about \$8,000,000 in the eighth year.

From the foregoing it is evident that it is only by the greatest care and economy, both in capital expenditure and in operation, that the roads can be made to pay at all. Advantage must be taken of every favorable circumstance, and each part of the system must help the other in order that the whole

should prosper. No more duplication of lines, waste in construction, or unjustifiably low rates can be tolerated, or the result will be disaster from which the roads cannot recover.

Whether the results of such a combination would be as favorable as have been outlined, is, of course, a matter of opinion. It depends on the growth of the traffic, the amount of additional capital required, and the ability of the officials to keep the operating ratio not higher than 73 per cent after the first five years. There cannot, however, be any question that such a combination offers the best chance of success. As each of the component parts is strongest where the other is weakest, combining them must, of necessity, give the least cost to complete, and consequently, the least fixed charges, and the high fixed charges are the big stumbling block in the way of success.

EFFORTS TO RELIEVE CAR SITUATION

Plans for dealing with the accumulation of loaded freight cars in the east, which has been aggravated by the recent unusually severe weather and by the curtailment of transatlantic shipping and also with the shortage of box cars in the west, were formulated at a conference of operating and transportation officers of eastern and western railroads at Washington on February 14 and 15, in conjunction with the Commission on Car Service of the American Railway Association and Commissioner McChord and Examiner-Attorney Dow of the Interstate Commerce Commission. As noted briefly in last week's issue, the conference was called especially to consider the request of grain and flour shippers from the northwest for measures to enable them to secure cars to send freight east. It was decided that the most important thing to be accomplished was to open up a channel for the eastbound shipment of flour and grain for domestic use and at the same time to expedite the movement of empty cars from the eastern roads to the west; and that export traffic, for the time being, should be subordinated to transportation of domestic shipments. It was decided that this could be accomplished by a continuation of the policy of placing embargoes against eastbound freight except foodstuffs, while making special efforts to move full trains of empty box cars west and south.

Eight trains of flour of 50 cars each will be assembled at and moved from Minneapolis weekly, two for New England points, two for New York City, two for Pittsburgh, one for Philadelphia, and one for Buffalo. At those points, except New York City, the trains will be broken for local distribution of the cars. The cars will be provided by the carriers serving Minneapolis and a corresponding number of empties will be delivered to these lines by the trunk line carriers through the Chicago gateway. The movement of the trains from Minneapolis will be divided among the carriers having lines from that city to Chicago by mutual agreement. The shipping interests agreed to inform all shippers of the plan and to divide the tonnage ratably. East of Chicago three of the eight trains will be hauled by the Pennsylvania, one to New York City, one to Pittsburgh, and one for New England via the Harlem river gateway; three by the Baltimore & Ohio, one to Pittsburgh, one to Philadelphia and one to New York City; two by the New York Central, one to Buffalo and one to New England via the Albany gateway.

A similar arrangement was made for the transportation from Minneapolis to New England points of six trains weekly of oats and corn for animal feed, in which may be included seed oats. Similar arrangements have been made for the supply of cars, division of tonnage among shippers and transportation from Minneapolis to Chicago. East of Chicago the Pennsylvania will haul one train to be delivered to the New Haven at Harlem River, the New York Central one train for the Boston & Albany, the Erie one train to go over the Delaware & Hudson and the Boston & Maine. The Michigan

Central, the Nickel Plate and the Wabash will each haul one train working through connections at Buffalo. It was the thought that this plan would provide immediate relief for any need which might exist for flour throughout eastern territory, or for animal feed in New England. Similar treatment will be accorded other sections if it is found necessary.

In order to deal more comprehensively with the entire situation, the Commission on Car Service telegraphed to some of the higher operating officers of the eastern roads to attend a conference on Thursday. At this all of the principal eastern lines were represented and an understanding was reached that they would carry out the wishes of the commission without any formal instructions.

The railroad officers who appeared before the commission were first asked to explain the situation on their lines and then to suggest remedies. T. E. Clarke, assistant to the president of the Delaware, Lackawanna & Western, said his road had an accumulation of freight for the west, principally in Buffalo, and also along the line, because its western connections had been unable to receive cars for a long time. Mr. Stroud, superintendent of car service, said that the Lackawanna had 94 barges of grain at New York awaiting ocean vessels; that it had enough cars for grain, but could not get rid of the accumulation at the terminals which had been increasing for a month. It had placed an embargo against grain except when boats were known to be available and an embargo against all western connections at Buffalo on all traffic. This was made necessary, he said, because of the accumulation of cars for western connections, which amounted to 3,300 cars on February 14, of which nearly 1,600 were for the New York, Chicago & St. Louis and about 700 for the Wabash. About 50 per cent of these were empty.

H. A. Worcester, vice-president and general manager of the Cleveland, Cincinnati, Chicago & St. Louis (the Big Four), said his eastern connections were badly congested by the accumulation of about 2,500 loaded eastbound cars, but that his western terminals were in good shape. The southern roads were holding a great many cars for the Big Four, including about 7,500 held by the Chesapeake & Ohio at Cincinnati which the Big Four could take as fast as the C. & O. was able to switch them. The Chicago division, he said, had been open for westbound business all winter, but connecting roads had not been able to switch out the westbound cars. Mr. Worcester thought that a moderation of the weather would result in a greater improvement in the situation than anything else, but thought that it would be necessary to continue embargoes against eastbound business until the present accumulation could be cleaned up.

P. E. Crowley, vice-president of the New York Central, said that the temperature had been 18 to 40 degrees below zero on many parts of his line for the two preceding weeks, and this had interfered seriously with the movement of cars. The New England roads were holding large numbers of cars for the New York Central and the New York Central had large accumulations of cars both eastbound and westbound. On February 14 it held 2,400 foreign cars at the Niagara frontier which could not be moved because many of them were completely snowed in; and at Buffalo it had 2,200 westbound cars, of which about 700 were empty. Westbound cars were also stored at many points along the line between New York and Buffalo where they had been left while the road had been struggling to move coal and other commodities especially needed locally. He promised that the New York Central would do its share in carrying out the plans for the movement of grain and flour or in complying with any order that the commission might issue; that President Smith had authorized him to say for all of the system lines that they were ready to co-operate in any way. Asked if he would make a special effort to move trainloads of empty cars west, keeping them out of the yards, Mr. Crowley said that the New York Central would be glad to do so and that he thought such a procedure

would be to the best interests of all concerned, as well as of his own line. He said that 4,000 or 5,000 empty cars could be moved westward as fast as they could be handled and that he was planning to make up solid trains. The New York Central had been doing that to some extent already, he said, but had been hampered by the severe weather. Embargoes had been used freely, no grain being accepted except on permits and he thought that the intelligent use of embargoes should be continued. Commissioner McCord said that Mr. Crowley's statement had given a great deal of encouragement and he especially urged the movement of solid trains of empty cars. At Mr. McCord's request, Mr. Crowley promised to furnish a daily report of the number of box cars moved westward. Mr. McCord suggested that the New York Central enter into a friendly rivalry with the Boston & Maine to endeavor to take the cars the latter had accumulated faster than the Boston & Maine could deliver them.

Mr. Clarke said that the Lackawanna would make every effort to deliver empties to western lines but that the cars were so badly mixed he did not think it practicable to attempt to make up solid trains of empties. It would be necessary to deliver loads and empties mixed.

W. J. McGarry, superintendent of car service of the Lehigh Valley, promised to make up solid trains of empties for westward movement.

J. J. Bernet, president of the New York, Chicago & St. Louis, promised the heartiest co-operation to permit the westward movement of empty cars. Mr. Bernet said that local traffic on his line was moving freely, but that all of his connections were holding large numbers of cars for it because of the lack of terminal facilities. On February 1 the road had been in normal condition, both at Chicago and at Buffalo, but on removing its embargo had accepted freight too freely, which had resulted in an accumulation. It had then placed new embargoes on both eastbound and westbound freight and in a few days would be in shape to assist in the westbound movement. He also promised to turn over to western roads about 20 cars a week as they came from the repair shops.

A. W. Towsley, vice-president of the Ann Arbor, described the conditions in Michigan, which he said were caused by the coldest weather in Michigan (and in Wisconsin) in 18 years. Car ferries across Lake Michigan had been frozen into the ice and this had backed up freight at Toledo. His company had recently bought a new steel car ferry for the service across Lake Michigan and he had spent 18 days in taking it from Detroit through the Straits of Mackinac into Lake Michigan in the worst weather he had ever experienced.

C. M. Sheaffer (Penn. R. R.), chairman of the Commission on Car Service, in concluding the conference urged upon all roads the necessity of expediting the movement of empty cars westward and said it seemed to be the consensus of opinion that export freight should be held back until the domestic situation could be relieved, in order to avoid a repetition of the conditions which existed last year because the railroads did not embargo export freight soon enough. This plan, he said, would make available enough empty cars to carry the grain for which permits may be issued.

The Minneapolis shippers asked if nothing could be done to move the 4,000,000 bushels of export grain at Minneapolis which had been contracted for, but on which no relief had been secured for 60 days. Mr. Sheaffer asked them to hold the question of export movement in abeyance until the domestic situation could be improved.

It was arranged that all of the trunk lines would furnish daily telegraph reports of empty box cars moved.

The Interstate Commerce Commission has postponed from February 21 to March 15 the effective date of its order issued on January 18 prescribing a partial code of car service rules. This is in order to give the railroads an opportunity to try out the code of car service rules adopted by the American Railway Association, which became effective on February 21.

TESTS ON TRACK INSULATION

An exhaustive series of physical and chemical tests was recently completed on samples of several brands of track insulation fiber to determine the normal characteristics of this material. The Reinforced Rail Joint Company, St. Louis, Mo., authorized these tests to be made in the laboratories of Robert W. Hunt & Company on account of the difficulty which it had experienced in fixing a proper specification under which to purchase fiber. The record of these tests and the following discussion taken from the statements of the engineers and the company which instigated the tests will undoubtedly be of interest to many railway men.

As an indication of the lack of information available regarding this material, the chemist of one of the large manufacturing companies is quoted as saying, "Despite the fact that the annual production of vulcanized fiber in this country exceeds 15,000,000 lb., comparatively little is known either of the method of manufacture or the properties of this widely used material. Books on industrial chemistry or cellulose products as a rule dismiss the subject with a few words often inaccurate or misleading, and in many cases give the impression that vulcanized fiber is still largely in a visionary state, interesting chiefly from the theoretical standpoint."

Practically all of the tests referred to were made on end posts as it was desirable to have the specimens of standard section without mutilation in order to get convenient dimensions and a common denominator. With one exception all of the brands tested have given fairly satisfactory service in the track. The purpose of the tests was not to determine which manufacturer's product was superior, and the samples were therefore identified simply by stamped letters, A, B, C, D, and X, which was the only information furnished to the testing engineers. Every effort was made to secure data which might form the basis for a rational specification to govern the characteristics expected in this material, and possibly to furnish information from which improvements in the manufacture of fiber may be made.

After careful consideration of the conditions affecting the service of fiber and the characteristics which it is most essential to understand, it was decided to run three sets of tests, beginning on original samples, the first to include saturation, freezing and heating, the second, boiling and baking, and the third, a chemical analysis. In the saturation and freezing test four samples were used with the following original properties: Weight, 45.55 to 54.18 gr.; volume, 31.54 to 37.98 c.c.; specific gravity, 1.24 to 1.44; and Brinell test, 17.6 to 25.2. After 144 hours of saturation, the weight of the samples had increased from 35.4 to 45.25 per cent, and the volume had increased from 55.9 to 63.5 per cent. They were then given 10 hours of baking after which the weight compared with the original showed 0.3 per cent decrease in one case, and from 0.48 to 2.38 per cent increase in the other three cases. The volume had increased from 0.3 to 5.9 per cent, and the specific gravity had decreased from 0.69 to 5.65 per cent. After a long series of additional alternate periods of saturation, freezing and baking covering a total of about 319 hours, the weight showed a decrease in two cases of 0.05 and 0.99 per cent as compared with the original, and an increase in the other two cases of 1.13 and 2.16 per cent. The volume had increased from 2.01 to 6.49 per cent, the specific gravity decreased from 1.61 to 4.89 per cent, and the Brinell test showed a decrease in strength of from 11.9 to 38.7 per cent.

In the boiling and baking test five samples were used and a record was kept of the weight, volume, specific gravity, and Brinell tests after alternate boiling and baking. The original properties of these samples were as follows: Weight, 16.14 to 21.21 gr.; volume, 12.11 to 14.82 c.c.; specific gravity, 1.29 to 1.443; and Brinell test, 17.6 to 25.2. After eight

hours' boiling, the weight had increased from 19.8 per cent to 24.1 per cent; the volume from 28.8 per cent to 42.5 per cent; and the specific gravity decreased from 7.14 to 14.60. After eight hours' subsequent baking, the comparisons with the original properties were as follows: Weight, one sample decreased 0.489 per cent, four samples increased from 0.353 to 3.06 per cent; volume increased 3.01 to 12.6 per cent; specific gravity decreased 2.32 to 8.91 per cent; Brinell test decreased 5.11 to 42.0 per cent.

After seven hours' boiling, seven hours' baking, seven hours' boiling, and eight hours' baking, the comparisons with the original properties were as follows: Two samples decreased in weight 1.2 per cent and 0.721 per cent, and three increased 0.043 to 1.06 per cent. In volume an increase was shown of 0.946 to 8.6 per cent; in specific gravity a decrease from 0.78 to 9.0 per cent; and in the Brinell test a decrease from 13.0 to 29.5 per cent. After 18 hours' boiling, 34 hours' soaking, 10 minutes charring, and 44 hours' soaking, the recorded weights were from 36.5 to 43.99 per cent higher than originally, the volume showed an increase of from 42.86 to 52.94 per cent, specific gravity had decreased from 2.32 to 9.55 per cent, and the Brinell test showed a decrease of from 68.1 to 77.6 per cent. After a final 10 hours' baking, the comparisons were as follows: One sample increased in weight 0.31 per cent, the other four decreased from 0.12 to 4.89, the volume had increased from 1.48 to 8.98 per cent, the specific gravity in one case had increased 1.59 per cent and the other four had decreased from 0.78 to 8.78 per cent, in the Brinell test the strength had decreased from 5.11 to 28.9 per cent. With one exception the Brinell numbers were not taken between the boiling and the baking tests. This should have been done as fiber in the track is in service in a saturated condition, and the mechanical values in this condition are necessary to more thorough understanding of fiber service. The chemical analysis showed content of chloride of zinc varying from 0.08 to 0.42 per cent. No investigation of the ductility of fiber was made in these observations. This deserves thorough study, however, as brittle fiber should not be installed in the track.

The saturation, freezing, and baking test shows that specific gravity is not the determining factor in arriving at the value of fiber. The boiling test suggests a relation between the loss in strength and the increase in volume at the respective periods, while there is no relation between the loss of strength and the specific gravity. It is suggested that a proper laboratory test to ascertain the properties which fiber should possess might be developed as follows: From each classification of fiber select a quantity, one-half of which is to remain in the laboratory and the other half to be installed in the track. Apply Brinell and scleroscopic tests to every piece of fiber, then have that which is to be installed in the track placed in joints of the same make in order to have the same mechanical treatment of all fiber. From these joints remove the insulation at stated intervals, bake it and apply the mechanical test, making a record of each. The mechanical test of the sample that lasts the longest should be accepted as a guide. The punishment of the fiber that is left in the laboratory should consist of alternate boiling and baking with mechanical tests taken after each boiling and each baking. A comparison of the results will show an analogy between the effects of the laboratory test and the track service, and suggest the proper laboratory procedure for ascertaining the properties of fiber on the same basis as would be done by service in the track.

CULTIVATION OF RAILWAYS' WASTE LANDS—English and Scottish railway companies generally are doing well in the matter of the cultivation of waste lands by the side of the railway. The Cambrian has issued a public notice inviting applications from the public for the cultivation of suitable land inside railway fencings, free of rent charge.

Steel Passenger Cars for the Burlington

Standard Designs Followed. Interesting Features in Lighting, Floor Construction and Roof Sheet Fastenings

THE Chicago, Burlington & Quincy has recently received from the American Car & Foundry Company 15 chair cars, 15 coaches, 9 combination baggage and smokers, and two combination coach and smokers, all being of all-steel construction. The specifications of these cars comply in detail with the government's specifications for steel cars, and in many cases exceed these requirements. The construction adheres very closely to that which was made standard on the Burlington a few years ago and which was described in the *Railway Age Gazette* of February 6, 1914, page 273. All of the new cars have vestibules, except the combination baggage and smokers, which have a vestibule on one end only, the other end being of the dummy type. The chair cars weigh 140,000 lb. and have a seating capacity of 64, which gives a dead weight per passenger of 2,190. The chairs are located on 3 ft. 7 in. centers. A space of 5 ft. on each end of these cars is given over to toilet facilities, one compartment containing the closet, the other the wash bowl with hot and

used, the sides being considered as being supported at the double body bolsters. This leaves the center sills to take care of the buffing and pulling strains only. These are figured for a maximum end shock of 400,000 lb. considered as a static load. The center sills are made up of 15-in., 33-lb.

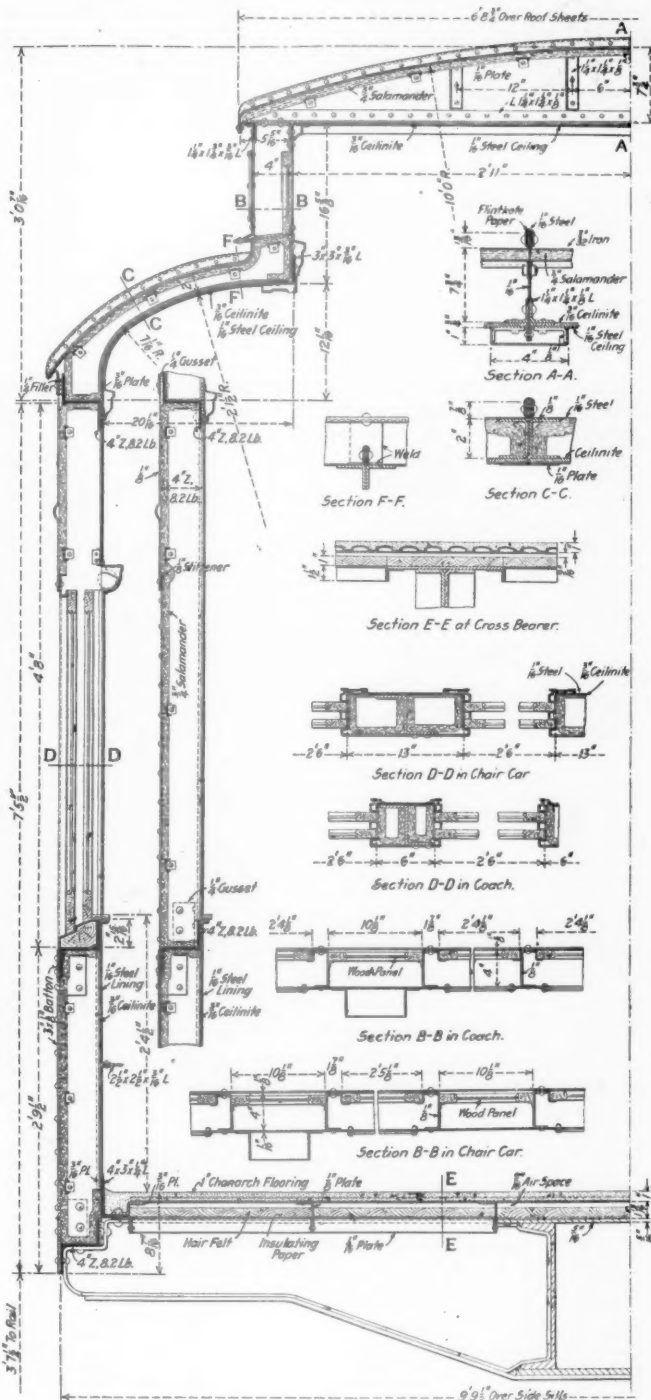


Interior of the Burlington All-Steel Coach

cold water, a drinking fountain and mirror. The women's end contains in addition to this two seats with leather covered cushions.

The coaches weigh 141,000 lb. and have a seating capacity of 84, giving a dead weight of 1,680 lb. per passenger. The seats are located on 2 ft. 11½ in. centers. A women's wash room and a closet occupies a space 4 ft. 6¼ in. long on one end of these cars and the men's closet and the wash room occupies a space of 3 ft. 4¼ in. on the other end. The combination coach and baggage cars weigh 137,000 lb. and have a seating capacity of 36. The length of the baggage section is 40 ft. ¼ in. and the coach section is 30 ft. ¼ in. long. This section is provided with a stove, a closet and cooler.

The cars are of the clerestory type, the upper deck windows having been omitted and the only openings are those required for the ventilators. The side carrying type of construction is



Cross Section of the Burlington All-Steel Passenger Cars

channels spaced 16 in. back to back with a 5/16-in. by 28-in. top coverplate extending from end sill to end sill and a bottom coverplate 5/8 in. by 24 in. extending between the draft castings. The bolsters and cross bearers are of built up con-

riveting the roof sheets. They are so applied that both rivet heads are on the outside of the car where they are readily accessible. This permits the roof sheets to be readily removed whenever desired.

The cars are insulated on the roofs, sides and ends with 3/4-in. 3-ply Salamander secured to the inside of the outside sheet, and 3/16-in. Ceilnite applied to the back of the inside sheet. The floor is built up of a 1/16-in. steel sub-floor on which is applied a layer of insulating paper, a 1-in. course of hair felt, a 9/16-in. air space and a No. 18 Toncan metal Chanarch flooring 1/2 in. in depth which in turn is covered with Magnesite cement. Aisle strips of interlocking rubber tiling are used on the chair cars and coaches. This floor construction has proved to be an excellent insulator of sound.

These cars are lighted by 50 and 15-watt lamps. The coach has 10 of the 50-watt lamps in the middle of the car, as shown in the illustration. The fixtures are of the semi-indirect type, being furnished by the Adams & Westlake Company. In addition to this there are twelve 15-watt lamps located as follows: Two in each vestibule, two in the women's compartment, one in the men's closet compartment, one in the men's washroom and one each side of the partition between the toilet compartment and the car. Five emergency candle fixtures are located on each side of the car, and two in each toilet compartment. The chair cars have eight of the 50-watt semi-indirect units, and twelve 15-watt units located substantially the same as in the coaches, and 12 emergency candle fixtures. The passenger ends of the combination cars are equipped with four 50-watt semi-indirect units, five 15-watt units, and four auxiliary candle fixtures. The baggage end is lighted by four 15-watt fixtures, and has four auxiliary candle fixtures. Three of the coaches are equipped with the axle generator system, the others being equipped with the head end system.

Six-wheel trucks of the Commonwealth Steel Company's design are used under all the cars. They are provided with the American Brake Company's clasp brake, and have 36-in. rolled steel wheels. The following is a list of the general dimensions of the cars:

Length over sills	70 ft. 8 1/2 in.
Length over buffers*	79 ft. 6 1/2 in.
Length inside	70 ft. 1/2 in.
Width inside of lining	9 ft. 1 1/2 in.
Width over side sills	9 ft. 9 1/2 in.
Width over eaves	10 ft. 1/2 in.

*For the combination cars this length is 74 ft. 9 1/2 in.

FIRE HAZARD OF FUEL OIL FURNACES*

By Anson Murphy

Alabama Great Southern

A serious hazard exists in fuel oil furnaces on account of the connection of the blast pipe of the furnace sometimes being improperly made. In some furnaces the blast pipe comes up from the ground or beneath the furnace, and enters the furnace in connection with the oil supply pipe. This construction is wrong, as there is a chance of the operator shutting off the air before the oil is turned off, allowing the oil to leak or run down into the blast pipe, which may fill up quite a space in the pipe. In starting the blast, gas may be blown off of the oil accumulated in the pipe, and this is liable to cause a fire or explosion. The pipe should enter at the burner from the top, so that in case of a leak, or the oil not being shut off, instead of running into the pipe, it will run into the furnace and be burned, thus eliminating the hazard. Fuel oil supply pipes should all be buried underground up to the point where they rise to the burner. The breaking of over-head pipes frequently causes fire in buildings otherwise considered comparatively safe.

*From the Quarterly Bulletin of the Railway Fire Protection Association.

WASHINGTON CORRESPONDENCE

WASHINGTON, D. C., February 19, 1917.

RAILROAD LEGISLATION.

Pork, preparedness, pacifism, patriotism and pure piffle have so engrossed the attention of Congress during the short session that railroad legislation, either favorable or unfavorable to the railroads, has had and is likely to have scant consideration. While the Senate and House committees to which most transportation matters are referred have been busy holding hearings and the usual grist of bills has been referred to them, Congress has practically done nothing either for or to the railroads since the passage of the Adamson law. Efforts are still being made to bring about a vote on the bills urged by President Wilson, including the much modified amendments to the mediation-arbitration law and the bill to enlarge and reorganize the Interstate Commerce Commission, but with the exception of the extension of time for the Newlands committee investigation, the only railroad bill that has got onto the floor of either house of Congress has been that passed by the House to require actions by carriers for the recovery of undercharges to be instituted within three years. Senator Newlands has tried several times to obtain consideration for the labor and Interstate Commerce Commission bills reported by his committee and Chairman Adamson of the House committee has asked for a special rule for consideration of the labor bill reported by his committee. Whether any action can be taken on these bills before March 4 is problematical, but the President is still urging them. Other railroad bills, including the one to give the Interstate Commerce Commission jurisdiction over car interchange, have not even been reported by the committees.

Proposed clearance legislation has been postponed until next session by agreement reached between representatives of the railroads and of the brotherhoods who were advocating a clearance bill. Charles J. Faulkner and George W. Kirtledge, chief engineer of the New York Central, representing the carriers, held a conference on February 16 with H. E. Wills, representing the Brotherhood of Locomotive Engineers, and W. M. Clark, representing the Order of Railroad Conductors, in accordance with an understanding reached at a recent hearing before the Senate Committee on Interstate Commerce, that the railroads and the brotherhoods should get together and agree upon a bill which would be satisfactory to both sides. After long discussion and exchange of views it was agreed to continue co-operation in the effort to agree on a satisfactory bill.

In presenting the report of the Committee on Interstate Commerce on February 10 on the labor bill, Senator Newlands made only a verbal statement. Since then the committee has submitted a formal report recommending the passage of the bill. Regarding the failure of the committee to approve the recommendation for prohibition of strikes pending an investigation, the report says:

"The committee was divided upon the subject of suspending the right of strike and lockout during the period of investigation and a reasonable time thereafter. A majority of the committee took the view that in many controversies heretofore existing between employers and employees the right of concerted action upon the part of the employees in giving up employment has been a potent factor in the betterment of the wages and conditions of labor and that, notwithstanding the inconvenience connected with a strike, it would not be wise, for the present at least, to modify or suspend the right of strike.

"Whilst a minority of the committee, including the chairman, realize that the strike is the only effective weapon which labor has thus far had in enforcing its just claims and that it has been useful and effective in accomplishing needed reforms as to the hours, wages and conditions of labor, they feel that the advance of civilization requires the substitution

of reason for force in all contentions between the state and the individual and between man and man, as well as between nations. Viewed in this light, the strike, while thus far and under existing conditions needed in order to secure for labor a just consideration of its rights, has been a process resulting in serious economic losses to both employers and employees, and in the last analysis, a resort to violence, it would appear to be the duty of Congress in its control of interstate commerce to see that a fair tribunal shall be created for the adjustment of labor disputes, and that when that tribunal is secured, the right of strike, as well as the right of lockout, should be suspended.

"They feel that this is particularly true regarding the conduct of interstate transportation, a great public service, intrusted by the government to quasi-public corporations, of such a nature that any suspension in its operations for a time, however short, inflicts grievous and insupportable wrongs upon society at large, involving the paralysis of production and trade, and ultimately suffering, distress and starvation. They feel that the public interest requires that such a public service should not be subject to interruptions, and that whatever may be said in favor of the right to strike in other activities, no excuse can be presented for the negligence of civilized society in permitting for a moment the great highways of transportation to be obstructed. As, therefore, the governmental investigation provided for by the reported bill is intended, first, to ascertain the facts; second, to ascertain the cause of the difficulty; and, third, to suggest a remedy with the view of producing an enlightened public sentiment both among the disputants and the community at large which would result in a peaceful adjustment of the dispute, they believe that the right of strike and lockout ought to be suspended during this period of investigation and for a reasonable time thereafter. In this view, however, they have been overruled by their associates.

"Having thus provided for a government investigation of labor disputes, and having decided that this investigation should not operate as a suspension of the right of strike during the period of investigation the committee felt it all the more incumbent upon them to protect the instrumentalities of transportation from any hindrance or obstruction. They have therefore provided in Section 2 of the bill that any person who alone or in concert with another or others shall knowingly and willfully by physical force or threats or intimidation obstruct or retard the passage of the United States mail, or any carriage, horse, driver, or carrier carrying the same, or the orderly conduct or movement in the United States of interstate or foreign commerce, of the orderly make up or movement or disposition of any train, or the movement or disposition of any locomotive, car or other vehicle, on any railroad in the United States engaged in interstate or foreign commerce, or who, after having, in concert with another or others, refused to work in his usual employment with or left the service of a common carrier by railroad engaged in the United States in interstate or foreign commerce, shall trespass upon its premises or any of its property for any of the purposes by this section prohibited, shall be deemed guilty of a misdemeanor, and for every such offense shall be punishable by fine of not exceeding \$100, or by imprisonment for not exceeding six months, or by both such fine and imprisonment."

With reference to the provisions of the bill giving the President power to take over railroads, telegraph and telephone lines for military purposes, the report says:

"Your committee has no doubt that the railway men would respond as promptly and as patriotically as any other class in the community to any reasonable requirement for the national defense. But your committee is of the opinion that in times of great emergency, such as war or threatened war, involving the defense of every section of the country and every class and interest in it, it is essential that the govern-

ment should be able to act promptly and decisively in controlling the service both of the railways and of their officers and employees. The necessity of this was particularly emphasized during the recent threatened strike when the nation was mobilizing its troops on the Mexican border for the national defense, and the recent developments in connection with the European war add additional emphasis to this necessity."

The report also calls attention to the President's recommendation for the enlargement and administrative reorganization of the Interstate Commerce Commission provided for in a bill passed by the House and reported favorably by the Senate committee. The committee urged the immediate consideration and disposition of this bill and added that the question of possible readjustment of rates following the possible increase in operating expenses as a result of a diminution of hours and increase of wages will add to the present burden of work now resting upon the Interstate Commerce Commission.

Representative Lenroot of Wisconsin on February 14 introduced in the House a bill, H.R. 20907, as a substitute for the bill reported by the Committee on Interstate and Foreign Commerce, which it is understood will receive the support of Republican members. This bill contains the provisions of the Adamson bill providing for an investigation of wage controversies by the Board of Mediation and Conciliation, as temporarily enlarged by the addition of representative of the employees and the employers and, like the Adamson bill, it does not prohibit strikes. It does contain a provision, however, which might indirectly operate very effectively to prevent strikes by providing that whenever a controversy arising between any employer and his or its employees shall be referred to the board, "it shall be unlawful while the investigation by said board is pending and before the publication of its report, for the employer to directly or indirectly increase the wages of his or its employees involved in such controversy, or compromise or adjust the controversy in any way that will cause an increase in operating costs of the employer, and during such time it shall be unlawful for the employer to declare or cause or practice a lockout." It is believed that very few strikes would be called if there were a law on the books prohibiting a settlement within three months.

The sundry civil appropriation bill reported to the House on Monday by the Appropriations Committee includes an item of \$5,450,000 for the Interstate Commerce Commission, including \$3,500,000 for the valuation of the property of the railroads. It also includes an item of \$10,000,000 for the Alaskan Railroad, an increase of \$4,252,380 over the amount for the current fiscal year.

MOTION PICTURES IN SAFETY FIRST WORK

The Pennsylvania Railroad is making extensive use of motion pictures for the purpose of impressing on its employees, particularly the shop and track employees and members of their families, the importance of "safety first" principles in railroad work and the proper and improper methods of performing the various duties of employees. The scenes are arranged also to illustrate the efforts of the management to promote the welfare of the employees. The pictures have been taken by the test department of the Pennsylvania Railroad and all the parts in the various scenes are played by employees of the railroad, or members of their families, where characters are women or children. The pictures are presented at various gatherings of the employees, frequently in the evening so that members of their families may attend.

One picture play entitled "Shorty, the Car Inspector," has been used for nearly a year and another entitled "Smoke Prevention" since last August among the employees in the mechanical department; and recently a new film entitled "The Americanization of Tony," which is designed especially to

interest the maintenance of way employees, has been displayed before large meetings of employees at Altoona, Harrisburg, Philadelphia and in the rooms of the Railroad Y. M. C. A. at Washington. "The Americanization of Tony" portrays the story of a young Italian who is attracted to America by hearing of the success of his friend Joe, who has been employed for some time in a section gang on the Pennsylvania, and who has a sister Maria in whom Tony is interested. Through Joe's efforts, Tony is given a job in the section gang, and his experiences are used to illustrate the importance of safety first principles and the opportunities afforded by the railroad company to its employees.

TRAIN LINE MAINTENANCE*

By A. McCowan

Supervisor Car Work, Canadian Northern, Winnipeg, Man.

The report of the Division of Safety of the Interstate Commerce Commission for the fiscal year ending June 30, 1916, stated that there were 908,566 freight cars inspected, of which 3.72 per cent were found defective; and 27,220 passenger cars, of which 1.82 per cent were found defective. The defects which were found by the inspectors were given in detail in tabular form, and those directly chargeable to the air brake numbered 18,696, which was far above those chargeable to any other part of the car, the next smaller item being couplers and parts.

The number of defects per thousand cars inspected was 45.06. Of this number, 20.58 defects were chargeable to visible parts of air brakes; the next smaller percentage being for couplers and parts, which is 6.09. The remaining 18.39 defects are chargeable to hand brakes, ladders, steps, hand holds, height of couplers, uncoupling mechanism and running boards.

While the proportion of air brake defects as shown in the report, which may be classed as train line defects is comparatively small, it does not show the relative importance of train line defects, because of necessity we have to watch this matter closely and replace most defective hose or broken train pipes immediately. As a result they are seldom discovered by Interstate Commerce Commission inspectors. In attacking this problem, therefore, we should not only attempt to cut down the percentage of cars which the Interstate Commerce Commission finds with defective air brakes, but decrease the material and labor in all repairs and renewals.

I have gone into the life of the air hose with the idea that there is a chance of decreasing very materially the number of hose necessary for renewals, and thereby the cost of renewals. The average life of the hose is considered about eight months for air hose and one season for steam hose. In Western Canada we find that the average life of a steam hose is a little over four months. While this may be looked upon as a season in certain parts of the United States, it cannot be so considered in the north.

The *Railway Age Gazette* stated in an editorial in 1912† that the average life of hose a couple of years previously was only eight months, and that at that time, the life of hose was probably less because the quality of hose was lower, and that the railways buy poor hose because mechanical injury destroys it in a few months, whether it is good or bad. It is the opinion of those familiar with the hose question that a hose should last three years if not subjected to mechanical injury. Since it seems that the average life is only eight months there is a chance for increasing the life of hose two years and four months; in other words, making it last $4\frac{1}{2}$ times as long. Let us see what this means in dollars and cents.

In the United States there were in 1915 in service 2,370,532

freight cars, 55,810 passenger cars, 98,752 company service cars—a total of 2,525,094 cars; and 66,229 locomotives. This means that there were in use 4,741,064 hose on freight cars, 111,620 on passenger cars, 197,504 on company service cars and 66,229 on locomotives, or a total of 5,116,417 hose. This does not include hose on the front ends of locomotives or between engines and tenders.

The renewals of these 5,116,417 hose, with a life of eight months, would be at the rate of 7,674,626 per year; while if the life were three years, they would be at the rate of only 1,705,472 per year. This is the saving at which we should aim in the use of materials only. There are many other things which, in the aggregate, probably represent even a larger amount of money: viz., the labor of applying and taking off, the cost chargeable to train delays caused by hose or train pipes bursting in transit, capital account tied up in material, etc.

Hose costs from 30 cents to 60 cents or more per foot. Increasing the life of the hose from eight months to 36 months will make a saving in renewals of 5,969,154 air hose per year, which at 55 cents each (22-in. hose) is equal to \$3,293,000.

It is claimed that loose or broken train pipes are even more prevalent than defects in hose, and this is borne out by the statistics of the Interstate Commerce Commission. The train line often breaks just back of the angle cock when cars are pulled apart without uncoupling the hose.

What causes all these defects in the train pipe and decreases so greatly the life of the hose?

An inspection of the scrap hose pile will show very plainly that most of the defects in hose are at the nipple end. This is where the great majority of hose fails. The train pipe usually breaks just back of the angle cock. These facts point plainly to the jerking apart of the cars while the hose are coupled, as the main cause. I do not mean to say, however, that pulling the cars apart is entirely responsible for defects at the nipple end of the hose. When a hose is not coupled up and a car is switched around the yard, the hose swings constantly and all the strain comes on the nipple end.

The strain on the hose when cars are pulled apart with uncoupling, with train line fully charged, is said to be 500 lb. This not only causes rupture of the hose at the nipple end, but it weakens the fabric throughout the entire length. This stretching is responsible for more hose failures than bending at the angle cock. In a test of 22,000 pieces of air hose referred to in the *Railway Age Gazette* for February 14, 1913, page 275, 82 per cent were found to be porous, and the porosity was not localized but extended all along the hose. The porosity of the hose is often charged up to poor material when, as a matter of fact, it is really caused by jerking apart.

We are accustomed to assume that tonnage reduction in the winter is necessary because of slippery rails, greater radiation of heat, and therefore less heat applied to the work of heating the boiler, poor lubrication, etc. Investigations on one road have shown that a great deal of this tonnage reduction is necessitated because of leaks in the train line, the impossibility of providing enough air to operate the brakes on long trains. This subject of leakage is a very important one, not only because of its effect on the tonnage that may be hauled and the amount of fuel consumed, but also because of its effect on the operation of the air pump and delays which are caused by brakes sticking.

Train line leaks may be classified under the following heads:

- Leaks at the hose coupling.
- Leaks in the hose itself.
- Leaks where the hose connects with the coupling.
- Leaks where the hose is attached to the train pipe.

Leaks in the coupler proper are usually chargeable to the wear and tear of the materials and gaskets, or to the coupling being poorly made by the brakemen or carmen. Leakage is also caused here by snow, frost and ice. Further, when an air hose freezes it often becomes so stiff that it will not bend.

*Abstract of a paper read before the Car Foremen's Association of Chicago.

† See the April 19, 1912, issue, page 878.

This causes the joint between the two hose to leak whenever there is any movement between the couplings, and also causes leaks where the hose is attached to the train pipe, the hose often being pulled loose at this point.

The difficulties encountered and time consumed in coupling and uncoupling hose in winter weather are considerable. Even at zero weather the hose becomes so hard as to lose all flexibility, and during coupling and uncoupling it is necessary to bend the hose, which usually cracks the rubber, making it porous. A hammer is commonly used for hitting the hose couplings to make them lock. This tends to jar the hose fitting out of place in the frozen bag at the nipple and coupling sleeve, causing a leak when the train is in motion, especially when rounding curves. The hammering on hose couplings also damages them to such an extent that it is necessary to remove the hose because the gaskets do not fit properly. This same trouble is experienced on the road because the couplings are drawn up by the frozen hose on curves, causing the brakes to creep on and making it necessary for the trainmen to hammer the couplings down in place. Another difficulty is that all angle cocks are not in proper position to allow the hose couplings to meet in line. The hose is twisted before the couplings can be made to lock and in case they are pulled apart very often they do not unlock, breaking the hose or the train pipe.

The time ordinarily consumed in coupling and uncoupling hose on a forty car freight train under ordinary conditions at the different winter temperatures is as follows:

Temperature	One man uncoupling	One man coupling
Zero	45 min.	50 min.
5 to 10 deg. below	50 min.	55 min.
15 to 20 deg. below	55 min.	60 min.
25 to 30 deg. below	65 min.	70 min.
35 to 40 deg. below	70 min.	75 min.

The time in the last column allows only for coupling the hose. Any extra time required for changing hose, gaskets, etc., depends entirely on conditions. This ordinarily takes 15 to 20 min., sometimes it takes an hour.

The amount of both yard and road detention chargeable to train-line trouble, not to say anything of car and freight delays, is worthy of consideration. One and one-half hours over each engine division is considered a good average of road detention to each freight train handled under northern winter conditions, caused mainly through hose trouble, creeping oil of brakes and extra time taken for pumping up in releasing. Along with this come flat and shelled wheels from creeping brakes; there is also excessive strain on the draft rigging. A broken train line means the cutting out of the car, and not infrequently twenty-four hours delay to it in getting repairs made.

The defects which develop because of the present hose connections between cars, as well as safety considerations and convenience, early led inventors to the consideration of an automatic connector. Quite a few connectors have been developed to the point of trial, but until very recently none has had an extensive installation.

We are using an automatic connector on the Canadian Northern in both freight and passenger service and have 207 cars equipped. The first installation was made June 6, 1914, so that we have had 32 months' experience with the connectors. The connector which we are using is the Robinson and it has also been installed on a large number of Canadian Pacific passenger cars.

You will realize that in the northern country where the climate is sometimes very severe, we have greater need for a connector than railroads operating in the south. It requires a good deal more steam to heat our cars, and the results of leakage are magnified. Our trains are harder to move after they have stood for a short time because the lubricating oils harden, and for this reason we have to cut down unnecessary stops or delays to a minimum. The makers of this connector are so confident of the life of hose which the connector

makes possible that they guarantee a life of three years for air hose used with it.

W. L. Crocker, chief despatcher of the Canadian Northern at Fort Rouge, Winnipeg, says that all trainmen have no hesitancy in affirming that, in their belief, both road and terminal detention would be materially reduced if all cars were equipped with these connectors. On the question of leakage I have only to quote from one of the reports which has been given on the connector:

"During the intensely cold weather of December and January, when temperatures sometimes in excess of 40 deg. below zero were recorded in certain parts of Canada where these cars were in operation, no trouble was experienced from leakage in connection with the device, although at the same time it was found impossible to prevent very serious leakage in ordinary hose."

I quote the following from the same report:

"To one familiar with yard and train service, there appears to be no room for argument about the need of such a device. The greater life of hose, the absence of broken train pipes resulting from uncoupling cars without first disconnecting the hose, the saving of time and labor in making up trains, and the reduction in the cost of pumping air, all of which might be classed as direct or apparent economies, would undoubtedly justify the cost of application alone, but the writer is even more impressed with the benefits that would be secured indirectly. Numerous leaks are found in hose and gaskets at all seasons of the year, almost entirely the result of the practice referred to above: viz, pulling the hose apart, thereby injuring the fabric and inner tube. In very cold weather, however, when the hose freezes, the difficulty in preventing air leakage becomes a controlling factor in the operation of long freight trains and they have to be reduced in length to a point where the air pressure can be maintained irrespective of the tonnage ratings or the ability of locomotives to haul them. Even at the best, this factor is responsible for a very great amount of terminal detention and labor on the part of car men trying to stop leaks."

The connector increases the life of hose because it eliminates all mechanical wear. The hose is never jerked or strained. Frozen hose does not interfere with its operation and leakage and breaks are cut down to such an extent that it is possible to run longer trains.

We have found on the Canadian Northern that the Robinson connector saves us a lot of money. We estimate the comparative cost about as follows:

Cost of present equipment.....	\$23.90
Cost of Robinson equipment	36.95
Difference	\$13.05
Cost of maintenance of present equipment for three years..	\$45.05
For Robinson equipment	37.49
The saving in three years is.....	\$ 7.56

For six years the cost of maintenance of present equipment is \$90.10, while for the Robinson connector it is \$47.80, including the interest on the difference in cost between the two systems. This means a saving in six years of \$42.30 made possible with the connector.

I have made no mention of signal hose and but little mention of steam hose. If these were both taken into consideration the estimated saving of \$3,293,000 resulting from the increased life of hose, would be very materially increased. The economy in hose and train pipe breakage, however, sinks into insignificance when compared with the immense amount which would be saved in eliminating train delays and reducing trainmen's wages and coal consumption, by the use of the connector.

WOMEN ON BRITISH UNDERGROUND RAILWAYS.—Out of the 3,500 persons employed on the Underground systems of London 550 are women.

Using Wire Mesh in Mattress Revetment

Metal Fabrics Have Been Used As a Substitute for Woven Willows in River Bank Protection for the Wabash

DURING the past year the Missouri river has caused the railroads in the territory between Kansas City and Jefferson City a great deal of trouble. The means commonly employed to stop the rapid erosion of the banks failed in several places, and it was necessary to devise new methods, one of which is described here:

Early in March, 1916, the Wabash, which follows the north bank of the river from Kansas City east, had a great deal of trouble at a point known as Missouri City, where the track had been moved four times to escape the attacks of the river. After the last retreat, which it was thought would be the final one, the river renewed its attacks with increasing vigor and in a short time came dangerously near to the revised location of the line.

A new method of bank protection had been tried previously by the Wabash on permanent river bank work, and in this emergency a modification of this permanent work was used with success at this particularly dangerous spot. This same method was used by the Missouri Pacific shortly afterward on a very much larger scale and at an equally dangerous point.

THE NEW BANK PROTECTION

The new bank protection consists of a form of mattress patented by A. O. Cunningham, chief engineer of the Wabash,



An Emergency Mattress

to take the place of the United States Government standard willow mattress revetment, commonly used on this part of the Missouri river. The latter consists of a fabric of woven willows, tied together and reinforced by longitudinal and transverse lines of cables, about 20 ft. apart, both above and below the mat. The construction is secured to the river bank by cables attached to "dead men," and is sunk to the river bottom by weighting it with rock. The bank is commonly graded to a uniform slope and paved with rock to an elevation above the high water line.

The Cunningham mattress consists of two continuous sheets of wire fabric made by sewing together the strips of wire mesh as obtained on the market in rolls. These two sheets of fabric are placed one upon the other with a layer of rock and willow brush between. The entire structure is made secure by tying the two fabrics together through the filling at intervals of two feet both longitudinally and transversely. The

portions of the mat above and below the water level are of necessity constructed by different methods and differ also in that the brush is omitted in the portion above the water line and, instead of single rocks at intervals, a solid pavement of rock is provided to a thickness of about 9 in.

The construction of the portion of the mattress to be submerged follows the general method employed in the willow mat revetment in that the mattress is fabricated on a barge from which it is launched and sunk as its construction progresses. The barge works on the down-stream edge of the mattress, moving down stream as the mattress is completed. In this case the deck of the barge is armored with steel rails or skids extending beyond the upstream side of the barge and curving down to the water's surface in the form of fingers. Along the down-stream side of the barge, stands are provided for the mounting of 14 reels of wire mesh which are obtained in widths of 58 in. and lengths of 300 ft. The mesh is unrolled from these reels and tied and stitched together to make a continuous web, the strips being laid, of course, parallel with the river. As soon as the section of the fabric occupying the space on the deck of the barge is completed it is loaded with a layer of rock and brush to an average depth of 9 in. and is then covered with the upper wire fabric. This consists of strips of wire mesh running at right angles to the direction of the flow of the river, the mesh being cut into lengths equal to the combined width of the submerged and bank mattresses. This upper fabric is sewed together exactly the same as the lower fabric to which it is tied through the brush and rock.

The mattress may be launched by various means. One method is to pull the barge away from the mattress by means of a hand capstan hauling on a 1½-in. line tied to a "dead man" or tree on the bank at some convenient point down-stream. The mattress is, of course, anchored at its upstream end to "dead men" placed in the bank.

The portion of the mattress built above the water line is placed on the bank which has previously been graded to a uniform slope. The Wabash specifications provide for a slope of 2½ to 1 which is obtained by the hydraulic method commonly used in river bank protection on the Missouri. The water is supplied by pumps on a barge from which a line of hose is run onto the bank.

The construction of the mattress on this uniform slope is identical with the portion in the water except that it can be accomplished much easier. The rolls of wire mesh are laid out parallel with the river bank, sewed together and covered with an average of 9 in. of riprap. This is then covered with the ends of the transverse strips of wire mesh which had been previously cut and sewed to the portion of the mat made on the barge.

The completed mattress is anchored to the bank by "dead men" placed 16½ ft. center to center along the top of the bank, 10 ft. beyond the shore edge of the mattress. As in the willow mattress revetment, use is also made of quarry spalls which are poured into the voids between the stones above the water line and have the effect of making the pavement more secure against erosion.

The Wabash adopted this form of bank protection after several ineffectual attempts to use the willow mattress revetment. It has happened that this railroad's difficulties with the Missouri river generally come at times of high water when it is impracticable to construct a willow mattress. With the strong current prevailing at such time there is always danger that the mattress will be destroyed while being woven

or sunk. The wire mattress can be put into any stage of water because of its strength and up to the present it has not been destroyed by the action of the water. It has also shown itself to be adaptable to emergency construction.

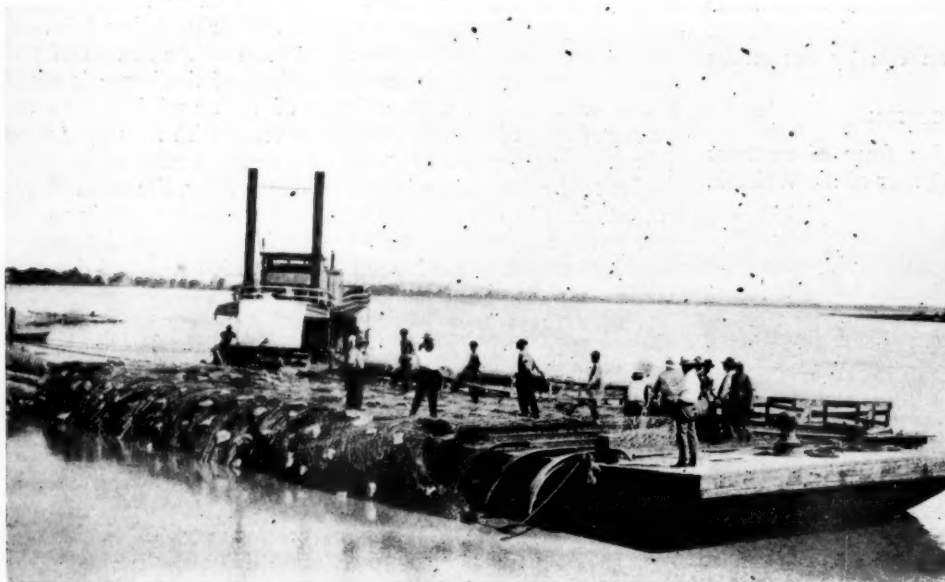
THE EMERGENCY MATTRESS

The application of this mattress to the emergency work consisted in the construction of a mattress substantially in the form used for permanent work on the top of the bank as close to the steep cutting bank as it was safe to permit the men to work. The fabric in this case consisted of American Steel & Wire Company triangular mesh No. 6 sewed together with No. 12 wire. This mattress was made in relatively narrow strips for as long a distance along the bank as possible. This strip was then reinforced as rapidly as conditions permitted by another laid alongside it farther away from the river, the two being securely connected. As the river continued to cut the bank the outer edge of the mattress was undermined with the result that the mattress would hang down over the edge of the cutting bank, reach the water surface, and as this process continued eventually become submerged a sufficient amount to protect the face of the embankment from the eroding action of the water. This

100 ft. wide in one place, over 80 ft. of it being in the water.

When the river fell to a stage where permanent work could be employed, it was found that it had changed its channel. In consequence it may be several years before permanent work will be required at this point and at such time lasting construction can be effected with the use of this temporary mat where it is far enough in the river, by taking the mat apart as it lies on the bank above the water line, replace the brush with rock, and put the mat back upon the bank after grading to a satisfactory slope. This will, in effect, give the same bank protection that the Wabash has perfected in its territory.

There has been considerable discussion as to whether the galvanized wire used in this form of mattress will stand the eroding and rusting action to which it will be subjected, particularly near the water line. It is contended by those who have had long experience in river work that the grinding action of the sand in the water will rapidly remove the galvanizing from the steel wire, thereby leaving the wire exposed to rusting action. Time, of course, can only make sure of this. The fact remains that, in most cases where the mattresses are once sunk and the paving well done, it matters little whether the wire lasts or not, as the silting action of the



Weaving the Mat



Twisting the Ties

temporary protection took care of the condition until the river fell and the permanent construction could be put in.

This method worked so satisfactorily on the Wabash that the Missouri Pacific, when in a similar position at Wellington, Mo., on the right bank, adopted the same plan, but applied it on a much larger scale, using a very much larger amount of the material. In the spring of 1915, the Missouri river made a short cut just above Wellington, Mo., the effect of which was greatly to increase its velocity, causing serious bank cutting at certain points just below Wellington. The method usually employed in such cases consists in making fascines or bundles of brush with rock in them, tied together with cables and thrown into the water, at the point of most serious cutting, supplemented by the use of pole mats thrown over the edge of the bank. This proved ineffective in this case. The method originated on the Wabash was used here for over 3,500 ft. of bank, at a cost to the Missouri Pacific, with the other temporary measures, of about \$35,000. The railroad used in the emergency any kind of fencing wire that could be obtained and all manner of brush, until the mat was completed and well anchored upon the bank. Under the conditions encountered it was necessary to build the mat over

river covers the mattress. Also in many cases after a railroad has fought the river at enormous expense, the river changes its channel, and the type of mattress, whether it rusts or erodes or not, is of no importance.

The Kansas City Bridge Company was the contractor for developing these types of mattress, both permanent and emergency, for the Wabash. We are indebted for the above information to A. C. Everham, terminal engineer for the Union Pacific, who was engineer of construction for the Kansas City Bridge Company at the time that this work was in progress.

FIRE HAZARD OF DICTAPHONES AND CALCULATING MACHINES.—In the use of dictating machines, calculating machines and other mechanical devices electrically driven there is considerable heat generated, and if adjacent to inflammable material serious consequences are liable to result. I have issued a circular requiring all dictating and other electrically driven machines to be disconnected at the plugs at all times when the machines are not in use.—W. F. Hickory, Superintendent of Insurance, New York, New Haven & Hartford.

RAILROAD VALUATION

The Interstate Commerce Commission has issued its tentative valuation report on the property of the Elgin, Joliet & Eastern and its leased lines, the Chicago, Lake Shore & Eastern and the Joliet & Blue Island, operating a total of 922.7 miles. The report places the cost of reproduction new of common carrier property, exclusive of land, at \$36,418,605 and the cost of reproduction less depreciation at \$27,899,986. The common carrier land of the three companies, aggregating 3,908 acres, is given a present value of \$3,396,671. The original cost of a part of the land is not shown but that of the 2,938 acres owned and used by the E. J. & E. is placed at \$1,361,514. A total of 874 acres of non-carrier land is given a present value of \$524,073 and the original cost \$151,363. The report also shows \$33,615 for investments in other companies. The original cost of equipment is placed at \$2,479,594, but the original cost of road, it is stated, cannot be determined from the records and no other values or elements of value were found to exist. It is stated that the E. J. & E. and its predecessors received cash donations amounting to \$237,156, donations of land for right of way amounting to 177 acres with a present value of \$64,668 and donations of non-carrier land, 8.23 acres, having a present value of \$617.25. The book cost of road and equipment of the E. J. & E. proper is \$18,643,454. The commission reports that the money actually expended was \$11,208,755. The E. J. & E. is credited with materials and supplies amounting to \$864,110 and cash on deposit with the U. S. Steel Corporation and in bank amounting to \$3,785,981. The capitalization of the E. J. & E. consists of \$10,000,000 capital stock and \$10,000,000 of bonds. The total capitalization of the system is \$38,100,000.

STATEMENT BY THOMAS W. HULME

In this connection Thomas W. Hulme, vice-chairman of the Presidents' Conference Committee on Valuation of Railroads, has issued the following statement for the information of the public, with reference to the six tentative valuations that have been made by the commission:

"In none of these reports has the commission undertaken to set forth its conclusion as to the *value* of these properties. The so-called tentative valuations served upon carriers consist of copies of the reports made by the engineering, land and accounting sections of the division of valuation.

"In July, 1916, the railroads protested to the commission that these latter reports were erroneous and incomplete in many respects and did not include all of the property owned by the carriers, and that they had been prepared by the division of valuation upon the basis of leaving to the commission the decision as to whether many items of cost should be included in the estimate of cost of reproduction. In reply the commission advised the presidents' committee that it had not passed upon some of the very important questions regarding principles and methods of valuation but that it would do so when these questions were presented to it at the time of the hearing upon the protests filed by the railroads.

"As the reports do not contain a summary of the findings of the commission, it is necessary to carefully examine them in order to get all of the facts. In the cases of the Texas Midland, Elgin, Joliet & Eastern and Winston-Salem Southbound railroad companies, the total of the findings exceeds the capitalization of those companies, as shown by the following statement:

	Capitaliza- tion.	Total-Comm. Findings.
Texas Midland Railroad.....	\$2,112,000	\$3,724,369
Elgin, Joliet & Eastern Ry., with its leased lines Chicago, Lake Shore & Eastern Ry., and Joliet & Blue Island R. R.....	38,100,000	45,023,058
Winston-Salem Southbound Ry.....	5,125,000	5,663,292

In the case of the Atlanta, Birmingham & Atlantic Railroad, the commission's report shows about \$29,000,000, while the protest filed by the carrier lists 56 different objections and

claims an original cost of \$43,502,122, and a reorganized capitalization of \$39,290,000.

"The commission estimated the cost of reproduction of the New Orleans, Texas & Mexico Railroad, which has 172 miles of road in Louisiana, at \$9,023,081, not including materials and supplies nor cash on hand; the report does not find 'original cost' but states that the books of the carrier show a cost of \$12,194,231. This company has 900 miles of railroad in Texas owned by three companies upon which the commission has not as yet reported. The New Orleans, Texas & Mexico owns all the securities of all these Texas roads, which cost it \$28,000,000, and the value of which must be ascertained before a proper comparison can be made with its capitalization of \$40,938,031.

"The differences between the railroads and the commission are well illustrated in some features by a consideration of the findings with reference to the Kansas City Southern Railway. The commission excludes from its findings of reproductive cost for that company, the cost, \$1,023,982 of a ship canal at Port Arthur on the Gulf of Mexico, which the railway company built as a portion of its terminal but subsequently conveyed to the U. S. Government without consideration other than that Port Arthur should be made a port of entry. The commission states in its report that the Kansas City Southern is one of the substantial and efficient railroads of this country. It nevertheless deducts \$7,698,888 for depreciation, which amount is determined by assuming that the various parts of the property have a service life of an estimated number of years; then further assuming that those parts while still rendering efficient service, have lost in value the proportion of the cost which is represented by the years that have passed since they were constructed or put in place. As the rapid development of the country and its transportation facilities have in the past required the replacement of many parts of a railroad and its equipment, while still capable of years of service, and as the railroads have not in the past—except for equipment—been required to create replacement funds out of earnings, the carriers vigorously protest that an attempt to find value by such a deduction for depreciation is unjust and any such uneconomical treatment of the capital invested in the railroads would make it more difficult if not impossible to obtain the capital necessary to provide additional railroad facilities.

"It is important, therefore, that until the Interstate Commerce Commission has determined the principles and methods of valuation to be finally applied by it and the same are reviewed by the courts, the holders of these and other railroad securities and the public should not conclude that any of these tentative reports represents the value of those properties."

PROTEST ON WINSTON-SALEM SOUTHBOUND

Henry E. Fries, president of the Winston-Salem Southbound Railway, has filed a protest with the Interstate Commerce Commission against the tentative valuation of its property, objecting to the tentative valuation as a whole and against every part of it. The general protest is similar to those that have been filed by other carriers, that the tentative valuation does not report all the facts, costs and data required by the act and that if it should be made final in its present form it would be impossible to determine therefrom what "final valuation" or that any "final valuation" would be prima facie evidence of the value of the property in court proceedings. It is stated that the commission has not reported the value of all the property owned or used by the carrier and has seemingly construed the word "value" as used generally throughout the act as meaning "cost" but that it does not appear whether or not in the phrase of the act "other values and elements of value" the commission understands that other costs are intended. The carrier protests that the commission should make plain its interpretation of the act in this regard so that the carrier may intelligently pre-

pare its protest against same if it is not satisfied therewith.

It is declared that the tentative valuation, judging by the conclusions and results reported, has seemingly been prepared upon a series of unsupported and arbitrary assumptions, some of which are in principle inconsistent with the others and some of which are contrary to both law and fact.

With reference to the engineering report, it is asserted that the plan of reproduction adopted as a basis in the tentative valuation contemplates a construction period of two years after completion of reconnaissance and location, whereas the carrier protests that the construction period required would be not less than five years and that additional time would be required to complete and develop the physical property. Objection is also made that many items of property owned or used, constructed at the carrier's expense, were omitted, such as the cost of crossings constructed at its expense and tracks and facilities of other roads used. Objection is made to the deductions for depreciation and against the use of unit prices determined as of June 30, 1914, when the date of valuation is stated to be as of June 30, 1915. The unit prices are also said to be inadequate and the following table is inserted comparing the unit prices used by the commission and those claimed by the carrier as proper:

Account.	Unit.	Prices used by Commission.	Prices claimed by carrier.
3. Clearing	Acre	42.44	45.00
Grubbing	Acre	53.70	58.00
Earth	Cu. Yd.	.23	.2525
Hardpan	Cu. Yd.	.32	.345
Loose Rock	Cu. Yd.	.38	.4125
Solid Rock	Cu. Yd.	.72	.7775
6. Dry Excavation	Cu. Yd.	.90	1.09
Wet Excavation	Cu. Yd.	2.10	2.61
Class A. Concrete	Cu. Yd.	9.40	9.93
Class B. Concrete	Cu. Yd.	8.60	9.09
Cast-iron Pipe	Ton	38.00	50.00
8. Ties, Cross	One	.50	.545
Ties, Switch	M Bd. Ft.	17.50	20.00
9. Rail, relay	Ton	22.00	31.00
10. Spikes	Lb.	.0205	.02155
11. Ballast, Rhyolite	Cu. Yd.	1.28	1.30
Ballast, Shalestone	Cu. Yd.	.18	.45
12. Track laying and surfacing	1000 Lb.	650.00	1300.00
15. Vitrified Pipe, 12"	Lin. Ft.	.33	.77
Vitrified Pipe, 18"	Lin. Ft.	.66	1.08
Corrugated Iron Pipe, 12"	Lin. Ft.	.63	.80
Corrugated Iron Pipe, 15"	Lin. Ft.	.77	1.16
16. Mile Posts	One	1.00	4.20
Lumber in Trestles	M Bd. Ft.	44.00	50.00
Class A. Concrete	Cu. Yd.	9.41	9.93
Class B. Concrete	Cu. Yd.	8.61	9.09
26. Poles, 25' Chestnut, Class B.	One	2.59	3.54
Earth setting	One	1.90	3.27
Rock setting	One	3.00	7.27
Poles, 35' Chestnut, Class B.	One	4.83	6.26
Poles, 45' Chestnut, Class B.	One	6.52	8.31
Cross arms, 3" x 4 1/4 x 8" Yellow Pine	One	.80	1.00
Pins, steel	One	.0348	.0487
Wire, No. 9 Bt. S. G. H. D. bare copper	1000 Lb.	39.28	52.50

Another table makes a comparison of certain quantities used in the engineering report with those claimed by the carrier and a summary sheet compares the amounts reported in the tentative valuation for cost of reproduction new, exclusive of land, with the minimum amounts that the carrier protests should be reported, aggregating \$5,948,608 as compared with \$5,121,188 reported by the commission. To this the carrier says there should be added items for working capital, contingencies, materials and supplies, appreciation and development cost, which would bring the total up to \$6,564,156.

On the subject of depreciation the carrier protests that inasmuch as on valuation date all depreciation in the physical parts of its property had been taken care of by proper replacements as needed and as there was no deferred maintenance, the cost of reproduction less depreciation could not be less than the cost of reproduction new.

The protest as to the land and accounting sections of the tentative valuation are similar to those filed by other carriers. The carrier says that the total area of its land is 1,761 acres instead of 1,373 as reported, that the report fails to include as carrier lands certain lands which it held for this purpose as a common carrier, and that the method used to ascertain the value of land on the basis of the value of similar adjoining land is erroneous, and that the cost of acquisition should be included. The value of materials and supplies on

hand is said to have been \$43,067 instead of \$5,180 as reported.

The commission has assigned the hearing on the protest of the Winston-Salem Southbound for March 19, the date previously set for the hearing on the Kansas City Southern and New Orleans, Texas & Mexico valuations.

The Interstate Commerce Commission has assigned the protest of the Atlanta, Birmingham & Atlantic and its subsidiaries, the Alabama Terminal Railroad and the Georgia Terminal Company, for the taking of testimony before Examiner C. F. Staples at the office of the Interstate Commerce Commission in Chattanooga, Tenn., beginning on March 1. Testimony will be taken concerning quantities, unit prices and classification of gradings, which are drawn in question in the protest. Testimony will also be taken concerning the value of lands of the carrier and their classification as carrier and non-carrier as fixed by the land report, as drawn in question by the protest. No testimony will be taken as to the cost of condemnation and damages or of purchase. Testimony, if any, upon this point, will be taken at Washington on Monday, March 19. Authority is given the examiner to adjourn the hearing to some more convenient point for the taking of testimony if in his judgment the interests of all parties will best be served thereby. All parties, including the division of valuation, must introduce their entire testimony at this hearing upon the matters covered, and no testimony will be taken at said hearings, or at any adjournment thereof, upon any other matters.

TWO YEARS' EXPERIENCE WITH POSITION LIGHT SIGNALS

The position-light signals—uncolored electric lights, to give indications both day and night—which were installed on the Pennsylvania Railroad between Overbrook, Pa., and Paoli, on the Philadelphia division, when that portion of the road was electrified, and which were described in the *Railway Age Gazette* July 21, 1916, and earlier issues, have now been in use over two years; and Signal Engineer A. H. Rudd has made a report on the results of his observations of the operation of the signals.

The number of failures of all kinds has been greatly reduced; insuring greater accuracy of information and promoting the promptness and regularity of train movements. By doing away with all moving parts except the control relays, the chance of false clear indications is reduced to the minimum. Of the 254 enginemen on the Philadelphia division, all but 1 are of the opinion that the light signals are better than semaphores. The enginemen are strongly of the opinion that in fog and snow storms these lights are better than any other kind of signal. Speaking of the aspects at night, and when looking at a signal from a point within 150 ft. of it, the enginemen say that the light signal is better than the semaphore; and in the daytime it is as good as the semaphore is at night.

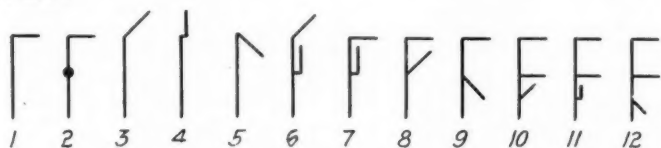
Mr. Rudd says that the maintenance of one of these signals, to be energized by current from primary battery, will cost about \$60 yearly including lamp renewals and painting once a year. In the few battery-energized signals now in use, the total cost of maintenance per signal per year was \$29.71 and for the track circuit \$18.16; total \$47.87. Three cells of battery are used on track circuits, and 16 cells for each signal. The estimate given above (\$60) is based on prices higher than those which prevailed when this record was made, and it assumes that there will be two track circuits for each signal; also that the track circuits will be occupied not over one hour a day.

Comparing costs with the costs of present ordinary practice, Mr. Rudd says that where semaphores are used, and where the electric power is generated at a central point and transmitted by wire, power must be provided to take care of a peak load which is encountered when the line is closed after

an interruption which has set all signals at stop; in such a case it is desirable that most of the signals be cleared without delay, and the generator must be about three times as large as would be required normally. With the light signals there is no such peak. The signals use a nearly uniform current at all times, and the current consumption of the signals is much less than that for operating the track circuits.

It is estimated that the position-light signals can be maintained and operated with half the current required for colored light signals; and as compared with motor signals the first cost is 15 per cent less and the maintenance cost is about equal.

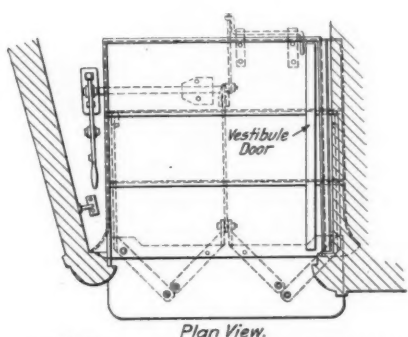
The simplified aspects of these signals, as adopted by the Pennsylvania Railroad, are explained in the sketch shown below:



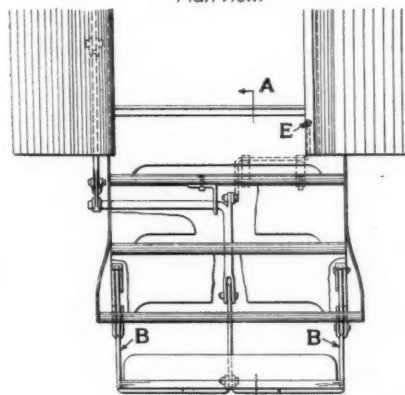
Standard Signal Aspects, Pennsylvania Railroad

This, in substance, is a simplified arrangement of the aspects which were shown in connection with Mr. Rudd's report printed in the *Railway Age Gazette*, July 21, 1916. The indications are:

1. Stop and stay.
2. Stop and proceed (Rule 504).
3. Proceed, prepared to stop at next signal.
4. Proceed.
5. Proceed with caution, prepared to stop short of train or obstruction.
6. Proceed, prepared to pass next signal at medium speed.
7. Proceed at medium speed.
8. Proceed at medium speed, prepared to stop at next signal.
9. Proceed at medium speed, with caution, prepared to stop short of train or obstruction.
10. Proceed at low speed, prepared to stop.
11. Proceed at low speed.
12. Proceed at low speed, with caution, prepared to stop short of train or obstruction.

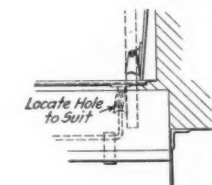


Plan View.

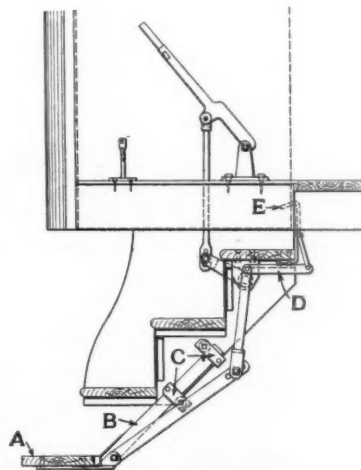


Elevation.

Step in Down Position.



Details of Safety Catch and Guard.



Section A-A.

Extension Coach Step for Passenger Cars

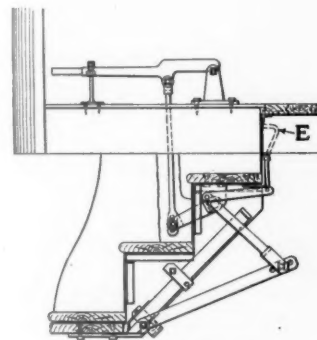
EXTENSION COACH STEP

The Duluth, Missabe & Northern has installed on a number of its coaches the extension coach step shown in the accompanying illustration. The arrangement is operated through a system of levers from the coach platform, the installation shown being that for a vestibule car. The step *A* is supported by the arm *B*, which operates in the bracket *C*. These brackets are attached to the inside of the step support and each contains one roller, the upper bracket having the roller on the upper side and the lower bracket on the lower side. This permits a free action of the supporting arm *C* as the step is raised and lowered. The step is operated by means of a bell crank lever, one end of which is connected by a link to the operating handle, and the other end by a link to the extension step itself. As the handle is raised the step will be lowered, and as the handle is lowered the step will be raised.

As a safety measure, the device is arranged so that it is impossible to lower the step while the vestibule trap door is down, or to close the vestibule door before the step is up. This is done by means of the link *D*, which is attached to an extension of the long arm of the bell crank lever and which operates the safety catch *E*. This safety catch extends through a hole in the foot stop of the upper step, just below the platform, and on the extreme right. A flat dog hanging loosely on a pivot attached to the trap door covers the hole in the foot stop when the trap door has been fully closed. This makes it impossible for the safety catch to extend through this hole and therefore makes it impossible for the step to be lowered. In case the trap door is closed before the step has been raised the flat dog will rest on the safety catch, thus preventing the trap door from closing suf-



Note: Neither Trap Door nor Vestibule Door can be Closed with Safety Catch Lever in Position shown. Raising Step Releases both to Close.



Section A-A. Step Up.

11. Proceed at low speed.
12. Proceed at low speed, with caution, prepared to stop short of train or obstruction.

The Pennsylvania, in addition to the Overbrook-Paoli installation, has position-light signals installed at a large number of places, all energized by primary batteries. Signals of this type are being installed extensively for distant switch signals and distant signals at interlockings.

ficiently to permit the vestibule door to be closed. With the step in the up position the handle is locked in a suitable catch attached to the platform of the vestibule. The illustrations show the step both in the "up" and "down" positions. The extension step was invented and patented by John T. Rodenbur, 218 Fourth avenue, West Duluth, Minn., a conductor on the Duluth, Missabe & Northern.

General News Department

Large numbers of employees of the Pennsylvania Railroad engaged in yard and station work, and in clerical service, have had their pay increased.

The call of the Canadian government for volunteers has brought out about 150 locomotive engineers, mostly from the rural districts, and it is expected that they will be put to work running engines.

The Interstate Commerce Commission on Monday postponed from February 21 to March 15 the date on which the railroads must comply with its recent order prescribing rules for the return home of coal and refrigerator cars.

A bill has been introduced in the New Jersey legislature by Senator Stevens providing for the repeal of the "full crew" law enacted in 1915, and empowering the Public Utility Commissioners to say what crews shall be required under different operating conditions.

A hearing was held before a committee of the Minnesota state legislature last week on a bill requiring the Chicago, Milwaukee & St. Paul to electrify its terminals in St. Paul. The committee took no action on the measure, but continued the hearing until March 1.

A bill has been introduced in the California state legislature extending the power of the state supreme court so that it may review the merits of the findings of the state railway commission without suspending its orders. Another bill proposes that in valuing property for the determination of rates, the commission shall state the value it assigns to each class of property of a public utility.

C. W. Watson, president of the Consolidation Coal Company, has sent a telegram to President Wilson, urging him to take steps to prevent aggravation of the present condition of railroad congestion, which might result from the additional burden on transportation facilities resulting from the handling of additional passenger trains at the time of the inauguration ceremonies in Washington on March 5.

The annual ladies' night dinner of the Rock Island Railway Club was held at the Great Northern hotel, Chicago, on February 13. Addresses were made by F. W. Main, auditor of overcharge claims and president of the club; C. T. Ames, chief clerk to the chief operating officer; C. B. Pratt, superintendent of the Chicago terminal division; C. A. Searle, manager of mail traffic and general baggage agent; L. F. Shedd, general safety supervisor, and M. L. Bell, general solicitor.

In the United States District Court at Philadelphia, Pa., February 14, Judge Dickinson imposed a fine of \$100 on the Pennsylvania Railroad for keeping an assistant yardmaster on duty more than 9 hours. The railroad company claimed that assistant yardmasters do not come within the terms of the hours-of-service law, but it appears that in this case the man named in the indictment gives orders over the telephone for the movement of trains, and the railroad's claim was rejected.

A bill has been passed by both houses of the Nebraska State Legislature, and now awaits the signature of the governor, whereby any railroad having tracks in Nebraska, will be required to construct 20 miles of new line each year on right-of-way now owned and unused. According to the terms of the bill failure to comply with this law will result in the forfeiture of all unbuilt and unequipped portions of such rights-of-way, and the corporate existence of such railroads or corporations shall cease as far as it relates to the portion of the road unfinished. The chief purpose of this bill, it is set forth, is to compel the construction of an extension of the branch line of the Chicago, Burlington & Quincy from Imperial, Nebr., to Holyoke, Colo. The railroads likely to be involved declare such a law unconstitutional and it is said that they will take it to the court.

In the United States District Court at New York City, February 19, the Western Union Telegraph Company was restrained from violating any of the provisions of a contract between the telegraph company and the Baltimore & Ohio Railroad. The Interstate Commerce Commission, on March 28 last, ruled that under this contract the telegrams to be sent over the telegraph company's wires for the railroad company without charge, or at reduced rates, included only those transmitted along the lines of the Baltimore & Ohio road. The railroad company claimed that it included also telegrams sent to points off the line of road, and it is now sustained by the court. The contract provides that the telegraph company is to transmit railroad messages free to the extent of \$10,000 a year based on the regular day rates; all messages in excess of the limit are to be paid for at half the day rate. In return the railroad is to carry free all employees of the telegraph company, as well as supplies and materials for maintenance or renewal up to \$10,000 a year; and half rate for transporting employees and freight in excess of the limit. Also, according to the contract, which was entered into in 1887 and is to run for fifty years, the telegraph company promises to pay the railroad \$60,000 a year in monthly instalments of \$5,000.

Car Shortage February 1

The American Railway Association reports that on February 1 there was a net shortage of 109,770 freight cars as compared with a shortage of 62,247 cars on January 1. The shortage on February 1 was practically the same as it was on December 1, and less than the shortage on November 1, when it was 114,908 cars. The increase in January was due to the large accumulations of freight which consignees for various reasons are holding in cars at the eastern seaboard; to the severe winter weather; to the large accumulations of freight held in cars at different congested points in the interior. Car shortages exist for the most part in the West, Northwest and Southwest.

Railway Earnings and Expenses in November, 1916

The net operating income of the railways of the United States for November, 1916, was less than November, 1915, by \$8 per mile, or 1.8 per cent, according to the compilations of the Bureau of Railway Economics.

Total operating revenues, \$322,359,605, exceeded those for November, 1915, by \$23,237,313. Operating expenses, \$206,536,874, were greater by \$22,628,463. Net operating revenue, \$115,822,731, made a slight gain of \$608,850. Taxes, \$14,061,233, increased by \$1,914,458. Net operating income was \$101,717,829, which is a decrease of \$1,288,655.

If spread over the mileage represented, operating revenues averaged \$1,396 per mile, an increase of 7.2 per cent; operating expenses per mile, \$894, were greater by 11.7 per cent; net operating revenue per mile, \$502, shows a decrease of less than one-tenth of one per cent; while net operating income per mile, \$441, showed a decrease of 1.8 per cent. Taxes per mile rose 15.1 per cent.

This summary covers 230,884 miles of operated line, or about 90 per cent of the steam railway mileage of the United States.

For the Eastern railways, operating revenues per mile exceeded those for November, 1915, by 5.4 per cent; operating expenses rose 14.0 per cent; net operating revenue decreased 10.0 per cent, and taxes increased 23.1 per cent. Operating income per mile decreased 13.7 per cent.

For the Southern railways, operating revenues per mile exceeded those for November, 1915, by 13.4 per cent; operating expenses rose 7.5 per cent; net operating revenue increased 24.5 per cent, and taxes 20.2 per cent. Operating income per mile increased 25.2 per cent.

For the Western railways, operating revenues per mile exceeded those for November, 1915, by 7.1 per cent; operating expenses rose 10.7 per cent; net operating revenue increased 2.3

REVENUES AND EXPENSES OF STEAM ROADS—NOVEMBER, 1916.

Account	UNITED STATES			EASTERN DISTRICT			SOUTHERN DISTRICT			WESTERN DISTRICT		
	Per mile of line			Per mile of line			Per mile of line			Per mile of line		
	Amount, 1916	1915	Increase over 1915 Per cent	Amount, 1916	1915	Increase over 1915 Per cent	Amount, 1916	1915	Increase over 1915 Per cent	Amount, 1916	1915	Increase over 1915 Per cent
Total operating revenues.....	\$322,359,605	\$1,396	7.2	\$139,442,175	\$2,353	5.4	\$47,488,832	\$1,113	13.4	\$135,428,598	\$980	7.1
Freight	236,247,239	1,023	7.1	100,155,892	1,690	3.7	35,864,593	841	746	100,226,754	777	8.9
Passenger	57,116,505	247	5.4	24,883,408	420	8.7	8,190,304	192	168	24,042,793	186	d 0.1
Mail	5,088,620	22	1.3	1,906,104	32	3.6	758,281	18	15	2,424,235	19	d 4.4
Express	7,915,474	34	22.0	3,689,097	62	51	1,089,359	25	21	3,137,018	24	20.4
All other	15,991,767	70	63	8,807,674	149	134	1,586,295	37	31	5,597,798	44	41
Total operating expenses.....	206,536,874	894	11.7	96,772,079	1,633	14.0	29,470,004	691	642	80,294,791	623	563
Maintenance of way and structures...	35,038,117	152	14.2	14,753,001	249	237	5,716,266	134	121	14,568,850	113	106
Maintenance of equipment.....	51,561,696	223	200	24,924,630	421	367	7,733,392	181	181	18,903,674	147	129
Traffic	5,136,240	22	1.5	1,983,918	34	31	948,802	22	22	2,203,520	17	d 1.9
Transportation	106,010,047	459	40.2	50,928,847	859	734	13,842,495	325	292	41,238,705	320	285
General	7,222,925	31	28	3,142,370	53	9.5	1,120,203	26	24	2,960,352	23	21
All other	1,567,849	7	1.1	1,039,313	17	15	108,846	3	2	419,690	3	d 32.5
Net operating revenue.....	115,822,731	502	d 6	42,670,096	720	d 10.0	18,018,828	422	339	55,133,807	427	417
Taxes	14,061,233	61	53	5,753,822	97	79	2,038,400	48	40	6,269,011	48	45
Uncollectible revenues	43,669	*	....	15,732	*	....	9,297	*	....	18,640	*	....
Operating income	101,717,829	441	d 1.8	36,900,542	623	721	15,971,131	374	299	48,846,156	378	372
Operating ratio—per cent—												
1916		64.1			69.4			62.1		59.3		
1915		61.5			64.2			65.4		57.4		
Average mileage represented—												
1916	230,884			59,258			42,660			128,966		
1915	229,560			59,082			42,139			128,340		

* Less than one dollar. d Decrease. * Less than one-tenth of one per cent.

per cent, and taxes 7.3 per cent. Operating income per mile increased 1.7 per cent.

The five months of the current fiscal year, compared with the corresponding period of the preceding year, show changes per mile of line as follows: Operating revenues increased 13.0 per cent, operating expenses increased 13.1 per cent, net operating revenue increased 12.8 per cent, taxes increased 14.3 per cent, and operating income increased 12.6 per cent.

Operating income per mile increased 3.2 per cent in the East, increased 24.3 per cent in the South, and increased 19.3 per cent in the West.

November operating income per mile was 1.8 per cent less in 1916 than in 1915, 81.1 per cent greater than in 1914, 54.1 per cent greater than in 1913, and 21.4 per cent greater than in 1912.

The Swissvale Fire

The Union Switch & Signal Co. is recovering rapidly from the fire of February 10, noted briefly last week, which destroyed its main machine shop and the erecting department.

The associated Westinghouse companies at once offered extensive facilities, and men were promptly set at work in the factories at Wilmerding, East Pittsburgh, and other places in the vicinity. Offers of assistance in the emergency were received from the other signal companies, the Hall, the General and the Federal; and these offers were accepted, and employees of the Union company were sent to their shops to use the machines and facilities at night. All of the company's patterns and drawings at Swissvale escaped the fire. The buildings formerly used for making munitions, which were immediately available, comprise over 65,000 square feet of floor space, and new temporary buildings are also being erected. Plans are being made for a new permanent machine shop, having a capacity much greater than that of the one destroyed, which was about 450 ft. long. Orders for large quantities of machine tools have already been given.

Proposed Union Station in Cincinnati

A correspondent at Cincinnati writes as follows:

Cincinnati has a union passenger station project which seems to be enveloped in considerable mystery. Two forces are at work. On one side is the mayor, who claims that he has been working with prominent railway officers who have settled to their own satisfaction the point in the city where the station should be placed. On the other hand, the trustees of the Cincinnati Southern, the railroad owned by the city, have made plans which they have placed before the governor of Ohio, with a request for an enabling law to allow them to proceed. The trustees' plan has been in process of formation for several months. It calls for the expenditure of some twenty millions of dollars in the purchase of a large tract of land—about a half mile in length—to make room for connection with other lines running through the Millcreek valley.

Cincinnati has a complicated railway problem. Originally an old canal—commonly called "the ditch"—led into the first railway station, and "the ditch" has been the artery through which the most of the traffic, freight and passenger, is taken.

In recent years the Cincinnati Southern trustees have spent millions in creating freight terminals that looked ambitiously to avoiding this narrow right of way; but not one word has leaked out as to the possible location of the union station that the trustees propose. However, the city is now arranging for a rapid transit loop that would care for several electric roads, all of which now terminate outside of the city, and the citizens have voted a bond issue of \$6,000,000 for the purpose of making this a reality. It provides station and terminal facilities for the trolley lines. This would be located in or near the central part of the city. It has been intimated that the passenger station of the trustees would be placed in close proximity to this. The governor is understood to have favored their scheme, but he has suggested that a referendum be taken by the people of the city on the issue of such a large bonded indebtedness. Several conferences have been held between the trustees and committees from powerful business organizations, and in most of the cases the verdict has been in favor of the plan.

The project of the mayor had its birth eight or nine years ago, when Archibald White and his partner spent thousands in

plans and specifications that were intended to solve both the electric and the steam road problems of the city. The city council thought so well of these that a franchise was granted to the promoters, but they were unable to make progress and their franchise was finally abrogated. But the project never died. The daily papers saw to it that rumors were kept afloat. About a year ago certain moves that were made by railway people indicated that conferences were being held between terminal engineers, superintendents and local officers, with a union station bearing; and three weeks ago the mayor left Cincinnati on a mysterious mission to New York City. On his return he announced that he had definite assurances that the railways concerned in the union station deal were in line and "Cincinnati could expect definite action in the near future."

One serious cloud on the whole fabric that has been outlined above is that the element of politics pervades the whole matter. The mayor is a Republican, with aspirations. On the board of the Cincinnati Southern are two men who have been prominent in democratic circles.

Railroads Guard Against Spies

A special meeting of the Chicago Railway Special Agents and Police Association, comprising secret service men of most of the railways radiating out of Chicago, was held on February 10 for the purpose of discussing plans for the protection of railroad property in the event of war. Many of the roads on their own initiative had already established a night and day guard over freight and express depots, roundhouses, power plants, bridges, yards and passenger terminals. For instance, the Chicago, Rock Island & Pacific had placed guards on its Memphis (Tenn.) bridge over the Mississippi river, and also on the Rock Island (Ill.) bridge; in the latter case in co-operation with the United States government. Likewise, the Chicago & Eastern Illinois placed guards on its bridge over the Kaskaskia river, near Shelbyville, Ill. The purpose of the meeting was to secure the most effective co-operation of the special agents of all the roads in protecting railroad property from possible damage by agents for a hostile nation. Past operations of alleged "spies" for belligerent countries are being checked up by the association, and information regarding the international sympathies of railroad employees is being gathered. Government secret service men are co-operating with special agents of the railroads wherever possible.

Detachments of state militia are guarding railroad bridges in Rhode Island and Connecticut. The New York militia is guarding the bridge across the Hudson river at Poughkeepsie.

The Massachusetts militia is guarding the Housic tunnel and the bridges across the Connecticut river and other public works.

Railway Storekeepers' Convention

At a meeting of the executive committee of the Railway Storekeepers' Association in Chicago on February 12 it was arranged to hold the fourteenth annual convention at Chicago on May 21 to 23, inclusive. Committee reports will be presented on the handling of rail, the handling of cross ties, the reclamation of scrap and other subjects. Special attention will also be given to the proper handling of materials distributed along the line, supposedly for immediate use and representing an investment of millions of dollars. An elaborate report will also be presented on the handling of stationery. In addition the committee is planning a number of interesting and novel features for the convention, which will contribute materially to its success.

The Engineers' Country Club

A number of well-known engineers of New York City and vicinity have organized the Engineers' Country Club, and, through the Engineers' Land Corporation, has acquired about 240 acres of highly cultivated and cleared land on the North Shore of Long Island near Roslyn (Hempstead harbor), 25 miles from New York. The properties include the old Willets manor, one of the historic Long Island homes. The manor house, altered and improved, will be used as an all-year club house. Golf experts say that it will be easy to create the finest 36-hole course in the country. There are about 300 miles of beautiful bridle paths in the vicinity of the club, and a meadow in the rear of the club house affords a fine landing place for aeroplanes.

The community plan of living will be developed and a number of bungalows will be rented furnished to members. The organization of the club provides for 500 resident members, living within 50 miles of the club, and not less than 500 nor more than 1,000 non-resident members. Engineers by profession, members of engineering societies and those closely allied with the engineering profession are eligible for membership. Charles F. Quincy, of New York, is the president of the club. A booklet describing its plans may be obtained from N. M. Garland, 30 Church street, New York, chairman of the membership committee.

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings and places of meeting of those associations which will meet during the next three months. The full list of meetings and conventions is published only in the first issue of the Railway Age Gazette for each month.

- AIR BRAKE ASSOCIATION.**—F. M. Nellis, Room 3014, 165 Broadway, New York City. Next annual convention, May 14, 1917, Hotel Chisca, Memphis, Tenn.
- AMERICAN RAILWAY ENGINEERING ASSOCIATION.**—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 20-22, 1917, Chicago.
- AMERICAN SOCIETY OF CIVIL ENGINEERS.**—Chas. Warren Hunt, 220 W. 57th St., New York. Regular meetings, 1st and 3d Wednesday in month, except July and August, 220 W. 57th St., New York.
- AMERICAN SOCIETY OF MECHANICAL ENGINEERS.**—Calvin W. Rice, 29 W. 39th St., New York. Next convention, May 22-25, Cincinnati, Ohio.
- CANADIAN RAILWAY CLUB.**—James Powell, Grand Trunk, P. O. Box 7, St. Lambert (near Montreal), Que. Regular meetings, 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal, Que.
- CANADIAN SOCIETY OF CIVIL ENGINEERS.**—Clement H. McLeod, 176 Mansfield St., Montreal, Que. Regular meetings, 1st Thursday in October, November, December, February, March and April. Annual meeting, January, Montreal.
- CAR FOREMEN'S ASSOCIATION OF CHICAGO.**—Aaron Kline, 841 Lawlor Ave., Chicago. Regular meetings, 2d Monday in month, except June, July and August, Hotel La Salle, Chicago.
- CENTRAL RAILWAY CLUB.**—H. D. Vought, 95 Liberty St., New York. Regular meetings, 2d Friday in January, May, September and November. Annual dinner, 2d Thursday in March, Hotel Statler, Buffalo, N. Y.
- CINCINNATI RAILWAY CLUB.**—H. Boutet, Chief Interchange Inspector, Cin'ti Rys., 101 Carew Bldg., Cincinnati. Regular meetings, 2d Tuesday, February, May, September and November, Hotel Sinton, Cincinnati.
- ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.**—Elmer K. Hiles, 2511 Oliver Bldg., Pittsburgh, Pa. Regular meetings, 1st and 3d Tuesday, Pittsburgh, Pa.
- GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.**—A. M. Hunter, 321 Grand Central Station, Chicago. Regular meetings, Wednesday, preceding 3d Thursday in month, Room 1856, Transportation Bldg., Chicago.
- INTERNATIONAL RAILWAY FUEL ASSOCIATION.**—J. G. Crawford, C. B. & O. R. R., 702 E. 51st St., Chicago. Next meeting, May 14-17, Hotel Sherman, Chicago.
- MASTER BOILER MAKERS' ASSOCIATION.**—Harry D. Vought, 95 Liberty St., New York. Annual convention, May 22-25, Hotel Jefferson, Richmond, Va.
- NATIONAL RAILWAY APPLIANCES ASSOCIATION.**—C. W. Kelly, 349 Peoples Gas Bldg., Chicago. Next convention, March 19-22, 1917, Chicago.
- NEW ENGLAND RAILROAD CLUB.**—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass. Regular meeting, 2d Tuesday in month, except June, July, August and September, Boston.
- NEW YORK RAILROAD CLUB.**—Harry D. Vought, 95 Liberty St., New York. Regular meeting, 3d Friday in month, except June, July and August, 29 W. 39th St., New York.
- NIAGARA FRONTIER CAR MEN'S ASSOCIATION.**—Geo. A. J. Hochgrebe, 623 Brisbane Bldg., Buffalo, N. Y. Meetings, 3d Wednesday in month, New York Telephone Bldg., Buffalo, N. Y.
- PEORIA ASSOCIATION OF RAILROAD OFFICERS.**—F. C. Stewart, 410 Masonic Temple Bldg., Peoria, Ill. Regular meetings, 3d Thursday in month, Jefferson Hotel, Peoria.
- RAILROAD CLUB OF KANSAS CITY.**—Claude Manlove, 1008 Walnut St., Kansas City, Mo. Regular meetings, 3d Saturday in month, Kansas City.
- RAILWAY CLUB OF PITTSBURGH.**—J. B. Anderson, Room 207, P. R. R. Sta., Pittsburgh, Pa. Regular meetings, 4th Friday in month, except June, July and August, Pittsburgh Commercial Club Rooms, Colonial Annex Hotel, Pittsburgh.
- RAILWAY DEVELOPMENT ASSOCIATION.**—D. C. Welty, Commissioner of Agriculture, St. L., Iron Mt. & So., 1047 Railway Exchange Bldg., St. Louis. Annual meeting, May 9-11, Louisville, Ky.
- RICHMOND RAILROAD CLUB.**—F. O. Robinson, C. & O., Richmond, Va. Regular meetings, 2d Monday in month, except June, July and August.
- ST. LOUIS RAILWAY CLUB.**—B. W. Frauenthal, Union Station, St. Louis, Mo. Regular meetings, 2d Friday in month, except June, July and August, St. Louis.
- SOUTHERN & SOUTHWESTERN RAILWAY CLUB.**—A. J. Merrill, Grand Bldg., Atlanta, Ga. Regular meetings, 3d Thursday, January, March, May, July, September, November, 10 a. m., Piedmont Hotel, Atlanta.
- TOLEDO TRANSPORTATION CLUB.**—Harry S. Fox, Toledo, Ohio. Regular meetings, 1st Saturday in month, Boody House, Toledo.
- TRAFFIC CLUB OF CHICAGO.**—W. H. Wharton, La Salle Hotel, Chicago.
- TRAFFIC CLUB OF NEW YORK.**—C. A. Swope, 291 Broadway, New York. Regular meetings, last Tuesday in month, except June, July and August, Waldorf-Astoria Hotel, New York.
- UTAH SOCIETY OF ENGINEERS.**—Frank W. Moore, 1111 Newhouse Bldg., Salt Lake City, Utah. Regular meetings, 3d Friday in month, except July and August, Salt Lake City.
- WESTERN CANADA RAILWAY CLUB.**—L. Kon, Immigration Agent, Grand Trunk Pacific, Winnipeg, Man. Regular meetings, 2d Monday, except June, July and August, Winnipeg.
- WESTERN RAILWAY CLUB.**—J. W. Taylor, 1112 Karpen Bldg., Chicago. Regular meetings, 3d Monday in month, except June, July and August, Hotel Sherman, Chicago.
- WESTERN SOCIETY OF ENGINEERS.**—E. N. Layfield, 1735 Monadnock Block, Chicago. Regular meetings, 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings. Annual meeting, 1st Wednesday after 1st Thursday in January, Chicago.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF DECEMBER, 1916

Name of road.	Average mileage operated during period.	Operating revenues				Operating expenses				Net from railway operation.	Railway tax accruals.	Operating income (or loss).	Increase (or decrease) last year.
		Freight.	Passenger.	Total (inc. misc.).	Maintenance of way and structures.	Equip-ment.	Traffic.	Trans-portion.	Miscellaneous.				
Baltimore & Ohio.....	4,545	\$7,384,732	\$1,428,387	\$9,544,591	\$974,676	\$1,546,272	\$195,545	\$3,713,975	\$65,341	\$6,679,265	\$310,704	\$2,543,412	\$225,913
Central of Georgia.....	1,919	838,070	371,515	1,354,774	131,183	198,546	38,163	377,782	1,146	785,287	72,201	496,963	129,435
Central of New Jersey.....	684	2,141,695	489,676	2,832,360	204,892	601,404	26,382	1,142,280	17,544	2,058,260	141,167	632,928	75,659
Hocking Valley Ry. Co.....	350	528,913	87,963	662,891	70,695	160,913	8,592	220,961	.....	476,821	92,418	93,651	37,718
Kansas City, Mexico & Orient of Mo.....	272	80,231	13,325	93,556	13,325	23,140	5,412	41,749	.....	6,225	5,218	1,643	3,629
Lehigh Valley.....	1,443	3,121,458	397,670	3,839,610	292,258	831,517	99,520	1,693,667	17,596	3,047,450	161,219	629,127	203,380
Louisville & Nashville.....	5,070	4,187,452	1,276,162	5,503,614	656,534	1,002,247	156,097	1,742,887	21,688	3,683,802	226,415	2,042,262	466,149
Oregon-Washington R. & Nav. Co.....	2,052	1,043,962	414,006	1,594,401	88,116	220,981	58,604	716,642	16,828	1,196,890	40,350	437,364	172,549
Pittsburgh, Shawmut & Northern.....	205	99,742	6,301	109,397	14,376	54,514	1,115	41,829	.....	119,245	2,050	11,897	97,564
Spokane, Portland & Seattle.....	555	295,910	122,142	436,768	48,583	48,645	11,267	118,628	4,362	242,689	57,445	136,605	32,983
Staten Island Rapid Transit Co.....	34	78,674	47,098	133,895	20,427	20,133	1,156	54,687	.....	99,049	9,000	25,846	1,707
SIX MONTHS OF FISCAL YEAR 1917													
Baltimore & Ohio.....	4,545	\$47,384,705	\$9,043,870	\$61,340,505	\$7,255,584	\$11,573,740	\$1,138,344	\$21,234,297	\$450,142	\$13,337,113	\$2,043,671	\$16,297,986	-\$173,467
Central of Georgia.....	1,919	4,919,160	1,903,498	7,636,876	991,881	1,201,435	235,977	2,161,266	5,737	4,827,859	386,066	2,418,989	656,397
Central of New Jersey.....	684	12,798,077	3,623,996	17,708,145	1,426,945	3,098,381	197,251	6,239,389	95,930	11,465,041	862,258	5,380,738	1,207,734
Delaware & Hudson Co.—R. R. Dept.....	886	11,008,608	1,813,850	13,614,367	1,061,352	2,637,009	175,777	4,805,793	125,502	9,282,315	4,332,052	3,957,173	1,081,218
Delaware, Lackawanna & Western.....	955	19,261,468	4,732,051	26,651,572	2,726,461	3,945,772	457,911	8,959,221	546,011	16,832,498	1,302,883	8,511,205	495,011
Denver & Rio Grande.....	2,578	10,805,617	2,355,835	14,087,323	1,489,367	2,208,616	249,251	3,599,252	179,295	387,646	576,000	5,366,792	404,068
Denver & Salt Lake.....	255	849,905	198,705	1,096,159	198,705	201,062	14,981	371,437	.....	30,128	764,881	269,220	63,501
Detroit & Mackinac.....	383	412,799	186,500	647,680	75,206	113,478	13,093	215,344	1,147	19,329	362,165	474,729	35,852
Detroit & Toledo Shore Line.....	81	828,363	.....	828,363	836,894	51,958	9,791	238,078	.....	19,329	474,729	433,839	32,048
Detroit, Toledo & Ironton.....	441	1,022,902	97,685	1,203,631	128,521	180,372	26,873	539,009	.....	40,012	914,788	282,844	31,152
Duluth & Iron Range.....	276	4,280,954	137,071	4,550,770	382,750	450,106	10,907	1,048,044	12,404	108,896	2,001,095	2,549,675	328,386
Duluth, Missabe & Northern.....	411	9,082,038	193,815	9,299,480	747,220	1,212,285	24,927	1,646,133	7,257	122,255	3,260,077	6,469,403	1,807,334
Duluth, South Shore & Atlantic.....	601	1,258,406	579,497	2,014,847	343,467	237,569	44,568	660,680	25,856	55,944	1,388,084	626,763	525,644
Duluth, Winnipeg & Pacific.....	191	717,141	134,748	880,883	121,035	131,201	12,019	285,715	2,048	32,102	584,120	296,763	252,792
El Paso & Southwestern Co.....	1,028	5,381,595	1,188,162	6,916,156	724,783	1,813,430	122,138	1,645,887	41,020	192,607	3,539,865	3,766,291	30,324
Elgin, Joliet & Eastern.....	800	6,596,777	141	7,043,026	603,137	1,679,642	44,191	2,096,020	175,548	4,588,641	243,977	2,209,997	542,676
Florida East Coast.....	1,988	25,112,758	5,191,014	33,911,423	2,912,751	7,022,304	569,622	13,091,404	238,447	800,216	24,590,753	9,320,870	8,538,342
Fort Worth & Denver City.....	732	2,854,746	820,840	4,037,951	327,338	507,284	53,581	1,105,625	20,242	160,058	1,878,446	1,781,562	1,173,410
Galveston, Harrisburg & San Antonio.....	434	2,309,014	882,840	3,454,229	311,903	442,227	203,095	603,095	16,002	1,894,784	111,523	1,348,840	222,215
Galveston Wharf.....	14	6,448,766	2,015,556	8,942,769	914,875	1,128,538	200,827	2,708,351	64,638	228,140	5,222,947	3,740,122	1,636,912
Georgia.....	307	1,292,452	474,723	1,914,041	149,378	246,963	81,896	671,420	760	55,097	1,204,607	709,434	299,621
Georgia, Southern & Florida.....	402	844,418	431,938	1,276,356	171,218	249,747	45,292	475,144	45	53,559	994,980	442,269	308,726
Grand Canyon.....	64	6,567	96,596	139,773	60,531	5,528	4,450	69,108	.....	1,426	141,027	9,726	110,193
Grand Rapids & Indiana.....	575	1,856,660	993,598	3,129,958	273,560	505,287	65,134	1,247,097	14,813	105,227	2,211,117	191,841	507,907
Great Northern.....	8,141	34,686,306	8,356,578	47,277,023	4,829,884	5,453,356	590,292	12,821,131	520,434	706,530	24,660,334	22,616,189	763,304
Gulf & Ship Island.....	308	751,924	188,701	1,000,291	95,080	164,266	29,281	297,230	1,925	50,906	631,994	368,297	307,668
Gulf, Colorado & Santa Fe.....	1,938	6,837,006	1,829,936	9,185,951	1,481,986	1,241,242	180,845	2,906,601	.....	306,670	6,063,675	3,122,276	1,855,205
Hocking Valley Ry. Co.....	350	3,235,252	514,509	4,588,837	435,610	1,033,913	52,091	1,287,413	.....	100,912	2,909,939	1,678,898	1,365,551
Houston, East & West Texas.....	191	617,489	192,064	864,861	127,456	91,457	12,932	266,727	4,847	19,624	522,020	310,160	133,188
Houston & Texas Central.....	914	3,203,133	944,160	4,423,210	425,800	468,851	104,434	1,200,467	29,558	110,847	2,334,254	1,899,120	897,521
Illinois Central.....	4,766	28,066,559	7,775,815	38,979,285	5,611,843	8,590,510	671,434	11,470,712	228,179	98,208	27,395,575	11,583,709	2,065,145
Indiana Harbor Belt.....	109	4,326,578	1,423,856	6,179,384	784,112	932,956	16,796	2,098,431	29,704	179,285	4,066,732	2,112,653	264,530
International & Great Northern.....	1,160	525,254	84,131	643,841	119,298	142,843	30,455	238,260	.....	35,374	564,230	79,611	39,404
Kansas City, Mexico & Orient of Mo.....	466	552,764	123,319	714,314	110,253	131,926	22,759	311,473	.....	28,270	604,681	109,634	69,012
Kansas City Southern.....	837	4,570,293	900,262	6,034,544	648,539	768,720	167,546	1,754,122	.....	209,381	3,540,681	2,493,863	266,405
Lake Erie & Western.....	900	3,341,820	392,783	3,936,337	336,785	650,757	84,342	1,243,022	.....	77,274	2,412,180	1,524,157	362,157
Lehigh & Hudson River.....	97	1,001,469	43,258	1,128,529	165,219	165,385	8,922	383,428	.....	28,799	751,752	376,777	137,691
Lehigh & New England.....	296	1,473,329	8,265	1,563,822	221,439	227,788	12,417	429,433	.....	41,500	932,365	631,457	315,615
Lehigh Valley.....	1,443	21,345,734	2,599,694	25,718,557	2,995,695	4,888,733	519,697	9,694,406	104,920	529,853	18,414,199	7,304,337	294,936
Long Island.....	397	2,253,605	4,887,070	8,264,499	795,244	855,111	79,311	3,133,100	42,969	211,321	5,109,764	3,194,735	318,935
Los Angeles & Salt Lake.....	1,154	3,821,363	1,583,312	5,947,177	522,309	868,507	195,495	1,637,018	115,812	214,612	3,713,942	2,535,235	371,435
Louisiana & Arkansas.....	279	583,468	125,071	734,785	156,228	105,258	22,367	208,808	.....	25,183	517,844	216,941	124,016
Louisiana Ry. & Navigation Co.....	347	932,815	170,600	1,166,368	167,807	132,227	39,652	365,836	.....	40,861	746,379	419,989	333,703
Louisiana Western.....	208	976,592	398,827	1,459,514	114,708	211,980	46,120	330,766	11,041	42,104	756,303	703,211	221,289
Louisville & Nashville.....	5,070	24,626,436	6,919,242	33,875,370	4,352,271	6,146,872	755,899	9,696,934	122,090	693,180	21,692,332	12,183,037	2,173,960
Louisville, Henderson & St. Louis.....	200	629,556	233,598	915,483	166,059	148,324	28,469	260,063	.....	19,541	622,455	293,028	89,423
Maine Central.....	1,221	4,184,717	2,090,863	6,808,108	942,372	6,808,108	77,561	2,531,116	36,812	168,772	4,655,929	2,152,180	331,092
Midland Valley.....	385	856,412	279,140	1,177,452	216,550	180,287	16,225	346,263	.....	40,887	807,883	369,569	80,470
Mineral Range.....	100	548,293	190,969	749,262	100,912	98,116	2,253	201,335	.....	9,038	450,714	134,499	38,486
Minneapolis & St. Louis.....	1,654	4,384,911	1,067,729	5,925,813	597,837	740,977	106,820	1,913,235	580	141,102	3,772,610	2,025,227	39,760
Minn., St. Paul & Sault Ste. Marie.....	4,228	12,948,077	3,645,601	18,020,596	1,719,309	2,162,597	283,543	5,138,778	101,979	380,904	9,752,897	8,267,498	642,203
Missouri & North Arkansas.....	365	458,218	225,694	731,337	107,895	87,095	23,459	226,226	.....	30,221	474,895	256,441	226,775
Missouri, Kansas & Texas System.....	3,865	14,309,651	5,291,867	21,001,991	3,917,676	3,917,676	371,859	6,655,215	131,471	588,207	15,850,285	5,424,806	701,539
Missouri, Oklahoma & Gulf.....	334	690,539	157,980	894,694	138,677	151,769	25,848	360,641	1,988	46,817	725,739	168,955	152,117
Missouri, Oklahoma & Gulf of Texas.....	134	159,451	3,641	164,581	17,247	17,247	10,408	63,221	.....	10,143	123,639	39,747	36,575

REVENUES AND EXPENSES OF RAILWAYS

SIX MONTHS OF FISCAL YEAR 1917—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses				Net from railway operation.	Railway tax acc'rals.	Operating income (or loss).	Increase (or decr.) last year.	
		Freight.	Passenger.	Total (inc. misc.).	Maintenance of way and structures.	Equip-ment.	Traffic.	Trans-portion.					Miscel-laneous.	General.	Total.
Missouri Pacific.....	3,930	\$13,648,802	\$2,785,861	\$17,434,663	\$3,125,988	\$3,536,977	\$442,091	\$6,151,593	\$51,456	\$414,126	\$13,687,759	\$4,128,764	\$117,886
Mobile & Ohio.....	1,160	5,082,061	780,147	5,862,208	768,654	1,519,632	220,431	2,041,259	14,383	187,893	4,240,494	1,477,087	111,927
Monongahela.....	108	910,137	63,772	973,909	163,621	66,902	21,144	233,148	.....	25,881	494,721	496,603	30,785
Monongahela Connecting.....	6	.....	.....	.....	213,391	92,532	2,181	353,948	.....	22,307	684,359	295	109,739
Morgan's L. & Tex. R. R. & S. Co.....	401	2,113,051	617,273	2,730,324	341,716	445,855	71,131	904,852	13,438	73,110	1,848,568	1,064,620	447,290
Nashville, Chattanooga & St. Louis.....	1,237	4,983,822	1,578,721	6,562,543	755,278	1,253,679	313,856	2,307,096	61,050	218,610	4,905,416	2,211,696	518,317
Nevada Northern.....	165	1,009,157	75,037	1,084,194	139,685	94,563	4,444	181,606	531	29,356	450,385	663,609	628,644
New Orleans & North Eastern.....	204	1,571,758	326,045	1,897,803	210,011	360,714	59,633	589,429	47,869	73,108	1,345,133	763,614	144,428
New Orleans, Great Northern.....	285	627,205	179,797	807,002	89,535	135,128	17,767	245,057	1,343	39,712	528,542	325,261	8,047
New Orleans, Texas & Mexico.....	191	561,880	147,257	709,137	123,321	113,957	32,774	190,690	.....	39,104	499,736	223,593	27,454
New York, Chicago & St. Louis.....	571	6,698,291	849,356	7,547,647	668,827	1,757,176	302,847	3,250,270	30,067	168,903	6,176,277	2,74,034	1,413,572
New York, New Haven & Hartford.....	2,006	19,724,871	16,731,024	36,455,895	4,943,129	5,209,548	255,472	15,815,444	595,345	1,045,186	27,510,954	14,432,175	1,574,000
New York, Ontario & Western.....	568	2,723,550	1,207,994	3,931,544	602,543	736,343	48,519	1,699,932	.....	113,310	3,196,886	1,447,471	135,261
New York, Philadelphia & Norfolk.....	112	2,228,818	291,875	2,520,693	213,556	522,949	12,036	925,513	32,105	70,340	1,792,574	925,585	153,127
New York, Susquehanna & Western.....	140	1,087,596	299,870	1,387,466	157,266	201,170	28,036	724,604	.....	42,801	1,105,880	469,387	88,783
Norfolk & Western.....	2,086	25,796,774	3,179,714	28,976,488	3,667,532	5,202,788	369,088	7,565,101	62,441	511,919	17,292,176	13,015,748	11,585,068
Norfolk Southern.....	908	17,161,423	600,656	22,162,079	348,775	377,538	51,227	832,897	599	114,043	1,725,099	845,459	131,268
Norfolk Pacific.....	6,508	32,292,496	7,737,926	40,030,422	4,946,843	4,215,574	622,993	11,747,465	565,209	694,176	22,421,396	18,572,802	1,038,992
Northwestern Pacific.....	507	1,263,032	1,049,584	2,312,616	252,181	329,094	30,992	813,099	5,090	38,808	1,505,455	1,076,726	967,357
Oregon Short Line.....	2,258	11,101,229	2,714,214	13,815,443	1,373,863	1,375,551	210,007	3,412,538	202,835	388,354	6,945,177	7,968,751	7,086,972
Oregon-Washington R. R. & Nav. Co.....	2,052	7,128,182	2,503,493	9,631,675	1,418,605	1,054,207	280,860	3,392,252	128,325	452,478	6,709,318	3,794,175	431,400
Panhandle & Santa Fe.....	670	2,527,372	557,135	3,084,507	411,821	502,956	26,799	772,256	72,431	1,784,993	1,438,063	103,826	347,668
Pennsylvania Company.....	1,755	29,367,912	6,597,268	35,965,180	4,358,693	6,789,252	537,221	13,962,342	246,351	857,685	13,232,279	2,999,880	10,827,190
Pennsylvania Railroad.....	4,536	83,637,801	23,967,967	107,605,768	15,065,864	23,370,460	1,311,890	41,033,822	1,658,244	2,875,358	85,270,340	33,364,001	28,716,163
Peoria & Pekin Union.....	19	70,456	31,263	101,719	54,867	81,235	451	284,666	.....	17,136	438,354	101,412	2,317
Pere Marquette.....	2,249	8,318,288	2,438,760	10,757,048	1,088,971	2,250,002	214,445	4,156,133	30,517	267,053	8,002,672	3,876,948	222,735
Philadelphia, Baltimore & Washington.....	718	6,919,419	5,284,086	12,203,505	1,720,499	2,578,348	178,160	5,048,840	784	322,383	9,842,429	5,617,647	334,753
Pittsburgh, Cincinnati, Chic. & St. L.....	1,489	18,303,765	5,118,250	23,422,015	3,339,163	4,978,159	436,314	8,933,953	177,254	626,001	18,372,919	7,969,429	1,266,601
Pittsburgh, Shawmut & Northern.....	205	776,912	432,824	1,209,736	149,671	303,049	7,599	299,982	.....	29,018	729,319	47,125	33,964
Richmond, Fredericksburg & Potomac.....	88	1,024,421	581,593	1,606,014	181,732	220,638	23,056	601,576	13,242	48,151	1,060,179	757,153	59,988
Rutland.....	468	1,071,737	703,734	1,775,471	219,175	333,454	61,481	689,395	7,413	44,254	1,355,173	721,631	103,802
St. Joseph & Grand Island.....	258	947,859	168,097	1,115,956	156,096	147,699	26,339	346,386	3,419	29,598	709,537	475,305	49,217
St. Louis & San Francisco.....	4,752	6,268,832	2,291,828	8,560,660	1,119,094	1,534,347	123,318	2,824,027	.....	246,804	5,775,172	3,386,037	361,911
St. Louis, Brownsville & Mexico.....	548	1,544,432	1,007,683	2,552,115	302,739	226,481	55,124	661,361	.....	59,611	1,300,762	1,389,756	43,942
St. Louis, Iron Mountain & Southern.....	3,555	14,807,792	4,106,040	18,913,832	3,496,840	2,951,039	420,295	5,179,079	56,096	396,291	12,422,380	7,881,059	809,494
St. Louis, Merchant's Bridge Terminal.....	9	.....	2,684	2,684	1,373,275	213,709	96,241	590,245	.....	43,717	948,888	424,417	52,883
St. Louis, San Francisco & Texas.....	244	461,984	191,485	653,469	124,127	16,429	14,360	236,118	.....	23,355	570,568	151,037	370,576
St. Louis Southern.....	943	3,853,687	940,990	4,794,677	462,727	789,652	185,689	1,118,878	17,249	151,358	2,722,762	2,340,979	209,465
St. Louis Southwestern of Texas.....	811	1,984,941	653,476	2,638,417	396,260	570,615	39,940	985,954	9,147	121,937	2,161,332	681,387	97,150
San Antonio & Aransas Pass.....	726	1,806,387	618,469	2,424,856	257,708	333,146	39,944	950,604	.....	77,437	1,765,544	807,964	276,482
Seaboard.....	3,454	9,086,375	2,765,470	11,851,845	1,341,577	2,072,480	481,582	4,332,913	64,408	374,993	8,335,726	4,305,851	617,641
Southern.....	6,983	26,721,195	9,617,175	36,338,370	5,671,343	5,567,397	1,012,430	12,344,219	240,901	1,098,987	25,687,543	14,264,227	15,791,146
Southern in Mississippi.....	281	366,682	233,313	599,995	139,431	55,573	14,201	228,149	.....	22,053	459,408	192,218	49,550
Southern Pacific.....	7,007	46,096,053	15,285,085	61,381,138	6,230,009	9,577,733	1,070,205	21,540,998	963,660	1,538,504	40,724,467	26,161,870	3,717,486
Spokane, Portland & Seattle.....	555	1,851,474	817,815	2,669,289	311,911	257,916	52,830	643,533	27,338	89,702	1,376,950	1,533,466	344,670
Staten Island Rapid Transit Co.....	24	320,638	346,714	667,352	106,026	87,066	6,888	327,016	.....	17,215	545,109	193,256	39,000
Tennessee Central.....	295	629,364	221,556	850,920	136,910	120,982	34,623	310,263	.....	40,045	476,822	261,329	28,972
Terminal R. R. Assn. of St. Louis.....	37	1,836,335	628,810	2,465,145	166,706	107,524	5,367	499,881	.....	23,465	750,793	771,313	205,026
Texas & New Orleans.....	468	1,836,335	628,810	2,465,145	306,372	479,580	53,184	837,482	49,324	61,647	1,792,709	867,416	109,919
Texas & Pacific.....	1,944	8,028,050	3,029,897	11,057,947	1,218,351	1,603,661	239,003	4,057,186	70,897	314,620	7,488,980	4,298,592	525,287
Toledo, Peoria & Western.....	248	361,223	226,139	587,362	95,919	150,903	15,214	224,320	.....	25,071	511,427	129,508	47,500
Toledo, St. Louis & Western.....	451	2,679,587	279,354	2,958,941	461,287	435,860	100,103	988,067	.....	56,725	2,031,547	1,078,710	123,916
Ulster & Delaware.....	129	247,579	218,413	465,992	70,346	71,979	8,851	243,068	2,043	22,118	418,406	158,007	31,488
Union Pacific.....	3,622	28,868,926	6,001,436	34,870,362	4,588,532	4,569,645	642,997	9,501,725	597,934	895,982	20,650,197	17,648,014	2,465,773
Union R. R. of Baltimore.....	8	844,610	159,318	1,003,928	81,853	.....	.....	36,962	.....	13,583	132,398	883,052	49,140
Union R. R. of Pennsylvania.....	32	.....	.....	.....	194,213	671,612	2,249	1,259,823	.....	39,903	2,166,760	933,463	61,302
Vandalia.....	917	4,988,758	1,424,274	6,413,032	895,716	1,298,757	150,552	2,366,487	70,101	150,186	4,1		

Traffic News

The Southern classification committee, W. R. Powe, chairman, Atlanta, Ga., issued Southern Classification No. 43 on February 15 to become effective April 15, cancelling Classification No. 42, issued on July 10, 1916.

The governor of Minnesota signed a bill on February 14, repealing a law authorizing the railroads of the state to charge 3 cents a mile for the first five miles of each passenger trip. The repeal became effective immediately.

Because of the inability of western railroads to supply cars for the transportation of automobiles, the Los Angeles & Salt Lake recently sent 50 flat cars from Los Angeles, Cal., to the Buick Motor Company plant at Flint, Mich., where they were loaded with 150 machines, and at once moved in a special train to Los Angeles.

The New York, New Haven & Hartford has notified the New York State Public Service Commission that on March 20 local freight rates within the state of New York will be advanced about 10 per cent. Similar increases will be made by the two New Haven subsidiaries, the Central New England and the New York, Westchester & Boston.

Attorneys for the Illinois railroads appeared before Justice Clarke of the Supreme Court at Washington on Tuesday and asked for an injunction to restrain the Attorney-General of Illinois from enforcing the state two-cent fare law. This action is taken so as to make possible the advance in fares which has been proposed to comply with the order of the Interstate Commerce Commission. The application was opposed by Attorney-General Brundage. The justice took the question under advisement. An injunction was asked pending an appeal from Judge Landis' recent decision denying an injunction.

At the annual election of officers and directors of the Transportation Club of Louisville, Ky., held at the Watterson hotel on February 12. George C. Devol, chief clerk general freight office, Louisville & Nashville, was elected president; Edward H. Bacon, division freight and passenger agent, Chicago, Indianapolis & Louisville, vice-president; W. T. Vandemburgh, commercial agent, Seaboard Air Line, secretary-treasurer; and the following as directors: Earl S. Gwin, president, American Southern National Bank; Samuel S. Riddle, superintendent of transportation, Louisville Railway; John S. Green, traffic manager H. Verhoeff & Co.; J. B. Wathen, Jr., president, Old Granddad Distillery Company.

The Texas Industrial Traffic League, representing the shippers of Texas, has addressed a letter to the Texas railroads inviting them to voluntarily withdraw the tariff increasing rates in Texas, which was put into effect by the roads on November 1 in accordance with the orders of the Interstate Commerce Commission in the Shreveport case. The Interstate Commerce Commission recently granted the request of the Texas shippers for a rehearing of the case, but declined to suspend the operation of the tariff except as to a few items. The league in its letter to the railroads points out that the withdrawal of the advanced rates would prevent the bitter controversy likely to result from various retaliatory bills against the railroads in the Texas legislature.

The order of the Missouri Public Service Commission requiring railroads to store free the baggage of drummers from Friday noon to Monday has been set aside by the Supreme Court of the State. The opinion, by Judge Bond, says: "We take the order of the commission to be one intending to give traveling salesmen the right in cases mentioned to a special exemption from storage charges not enjoyed by other travelers. This being its essence, the order on the record before us was unfair and unreasonable. The Public Service Commission is not a Legislature nor a Court. It is simply a commission created by the Legislature to make findings of fact and orders based on such findings, which if reasonable and within the power of the commission may be enforced in the courts."

Morgan's Louisiana & Texas Line has now under construction three ships, which will be placed in service by July 1. Two of them will be used in the Galveston-New York service, and the other, an oil tanker, will ply between Galveston and Tampico. The two new coast-wise steamers are somewhat larger than the four biggest ships now in the Galveston-New York service, having a dead-weight carrying capacity of 7,000 tons. The new vessels are equipped with 5,000 hp. engines, designed to propel them at a speed of 15½ knots an hour. The larger vessels now in service have 5,600 hp. engines that will drive them at a speed of 16 knots. The new ships are named the El Capitan and the El Almirante. They are being built at Newport News, Va., by the Newport News Ship Building & Dry Dock Company.

The recently created Shipping Board is making efforts to re-establish Coast to Coast freight service via the Panama Canal. In a letter to President Wilson the board points out that nearly all of the American-built tonnage, which has been serving the needs of the producers and consumers on the Atlantic and Pacific coasts through the Panama Canal has been withdrawn for more profitable service elsewhere, and the President is asked to transfer to the board a number of vessels now owned by the war department to be chartered by Americans for service through the canal, in accordance with the provisions of the new shipping act. The board points out in its letter that thousands of tons of products are awaiting the return of service through the canal or have been subjected to higher rail rates, but that it is not the purpose to overwhelm this trade with ships, nor to enter any service which is now adequately served by water routes. According to the Canal Record, 1,253 ocean-going vessels passed through the canal during the calendar year 1916. The aggregate net tonnage was 3,933,689 tons, and the total cargo was 4,931,911 tons.

Grain Shippers Appeal to Railroads for Cars

J. B. Griffin, president of the Chicago Board of Trade, sent a telegram to the presidents of all eastern railroads last week, asking their co-operation in furnishing cars to move grain to market. The telegram reads in part as follows:

"Owing to withering heat, drought, blight, rust and various other causes, the world's production of all food supplies in the year 1916 was materially subnormal; in fact, the relation of supply and demand is so close that extraordinary ingenuity is necessary in the matter of distribution to insure against famine. Generally speaking, industries have been provided with sufficient equipment to meet their abnormal demands, while the supply furnished by eastern railroads for distribution of grain and food products generally has been less than 25 per cent of the requirements. This fact is largely responsible for the present high cost of living, and unless immediately relieved there is great danger of a shortage of necessary supplies to sustain human and animal life in this country as well as in Europe. At the present time there are 30,000,000 bu. of grain in the city of Chicago awaiting shipment. Approximately 10,000,000 bu. in addition to this are now in cars or on track in transit to Chicago. The country elevators tributary to Chicago are holding 50,000,000 to 75,000,000 bu. of additional grain, which cannot be moved forward unless eastern railroads furnish equipment to move our present stock in and around Chicago. The furnishing of cars by eastern railroads to move forward this tremendous supply of grain is a matter of national necessity."

Mr. Griffin and other members of the board of trade held conferences with Chicago officers of eastern lines to discuss ways and means of relieving the situation. The plan agreed to by the principal railroads of the East at Washington on February 15, which provides that daily special trains of grain and flour will be moved east from Minneapolis until the danger of the food shortage is averted, elicited a vigorous protest from Chicago grain and flour men, who maintain that Chicago is being discriminated against in favor of a market 400 miles farther from the East.

On February 17 J. B. Hupp, general manager of the Kansas Flour Mills Company, sent a telegram from Wichita, Kan., which was endorsed by the Kansas Merchant Millers' Association in session at that city, to traffic officers of Chicago roads, asking that flour be given preference over other freight because of its importance to the consumer as a food stuff, and that cars

containing flour be assembled at Missouri river points, and shipped east in solid trains. The telegram suggested that a conference of shippers and railroad men be held in Chicago this week for the purpose of giving the millers an opportunity to show the necessity of this measure. Railroad officers, when asked their opinion on this request, stated that it was far more important to dispose of the cars of flour and grain already standing on their tracks between the Missouri river and the Illinois-Indiana state line, than to ship more cars into that territory and thereby increase the congestion.

Appeal for Movement of Company Material

The Lumbermen's Association of Chicago has sent an appeal to railroad purchasing agents for the free movement of railroad company material, pointing out that the unusually heavy traffic of the last year has proved a heavy strain on cars and that unless material is available for making repairs, many cars will be forced out of service and the car supply problem will become even more acute. The notice sent to the purchasing agents reads in part as follows:

The necessity of early deliveries on company material to enable carriers to handle repairs and to increase equipment and facilities, is being retarded very seriously at this time by embargoes. On account of embargoes being issued through the operating department in connection with the traffic department, we note that in many cases carriers are not showing that company material will be accepted. This results in company material being delayed until a special permit may be issued. We consequently suggest that those purchasing departments which are in need of material for the operating department, co-operate with those issuing embargoes so that company material may be accepted in all cases. While the lumbermen are glad to do what is possible in the way of securing shipments, it is being found that, unless properly protected in embargo notices, company material is badly delayed and is side-tracked with other freight.

More Embargoes

The Atchison, Topeka & Santa Fe placed an embargo on all freight, except livestock, perishables, coal and oil, consigned, reconsigned or diverted to any point east of the Indiana-Illinois state line and north of the Ohio river, effective at midnight February 14. Since February 8 the Chicago, Milwaukee & St. Paul has embargoed all carload freight, except live-stock, perishables, fuel and tank cars, loaded or empty, destined to Milwaukee or Chicago, or points east or south thereof. The Chicago, Burlington & Quincy has enforced an embargo against freight destined to points east of Chicago since January 18. The Delaware, Lackawanna & Western announced an embargo on all west-bound shipments going west of Buffalo, N. Y., effective February 14.

The milder weather of the past week has relieved the freight congestion at Atlantic seaboard terminals to a considerable degree. Embargoes are still maintained in all directions, but with very limited modifications here and there, as circumstances make relaxation possible. All of the trunk lines report that large numbers of empty cars are now being moved westward. Considerable numbers of ships have sailed for Europe, fully loaded, but shipping interests in many directions are still in suspense.

From Detroit and other automobile centers it is reported that considerable numbers of new automobiles are being sent to buyers long distances by their own power.

The Ohio Public Utilities Commission called the traffic officers of all the railroads in the State to Columbus last week to gather information and to take action concerning shortage of coal at many places. At Buffalo, N. Y., the Chamber of Commerce held special meetings to deal with the scarcity of coal, complained of by many users.

From Jamestown, N. Y.; East Liverpool, O.; Van Wert, O., and other places come reports that the mayors have seized carloads of coal standing on side tracks, and have distributed the fuel to householders in need. At Pottsville, Pa., last Saturday and Sunday, the Philadelphia & Reading Coal & Iron Company had three times the usual number of men engaged in loading anthracite coal for shipment. On the Halifax & Southwestern and other railroads in Nova Scotia a shortage of coal made necessary a reduction in the number of regular trains run.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission has suspended until June 15 increased rates on packing house products from Indianapolis, Ind., to Ohio River crossings applicable on traffic destined to southeastern territory.

The commission has suspended until June 18 proposed increases in commodity rates on potatoes and certain other vegetables in carloads from points of origin in Colorado, Utah and New Mexico to Oklahoma, northern Arkansas and northern Texas points.

The commission has suspended until June 15 the cancellation of joint proportional rates on wheat and corn in carloads from Kansas City, Mo., and other Missouri River points to interior Illinois milling points, which would result in an increase of about 2 cents per 100 pounds.

The commission has suspended until June 17 the cancellation of joint commodity rates on pig iron, carloads, from Birmingham, Ala., and other southern producing points to Dover, N. H., and other New England points via rail lines in connection with the Mallory, Clyde and Ocean steamship companies.

The Commission has suspended until June 15 tariffs filed by the eastern railroads naming increased storage charges on domestic and export freight held beyond the free time in carriers' warehouses at New York harbor points. The present storage charges range from $\frac{1}{2}$ cent per 100 lb. for five days up to 9 cents for 60 days. The suspended tariffs provide a scale of charges ranging from 1 cent for five days up to 28 cents for 60 days. The commission has also suspended tariffs providing for a reduction from five days to two days in the free time allowance on domestic freight held at Jersey City and other points in New Jersey for final delivery at New York or Brooklyn or beyond.

The commission also suspended tariffs providing for an increased charge for the lighterage of heavy freight consisting of pieces weighing from 3 to 20 tons in lots of 50 tons or more. Under the present rules no extra charge is assessed for the handling of such freight when the rates to or from the New York harbor points include lighterage. Under the suspended tariffs an additional charge of 40 cents a ton would be made.

PERSONNEL OF COMMISSIONS

Charles S. Hervey has been reappointed a member of the New York State Public Service Commission, First district.

John A. Barhite, of Rochester, has been appointed a member of the New York State Public Service Commission, Second district, in place of D. P. Hodson. Mr. Barhite has been a county judge for 11 years.

COURT NEWS

Providing Side Track Facilities

The Minnesota Supreme Court holds that the state under its police power may require a railroad company to provide such side track facilities to industries adjacent to its tracks as shall be found to be necessary and reasonable under all the circumstances, and may apportion the necessary expense therefor between the company and the industry in such manner as shall be found to be reasonable.—*A. C. Ochs Brick & Tile Co. v. C. & N. W.* (Minn.) 160 N. W. 866.

Ejection Without Demand for Fare

An illiterate woman boarded a train with an order for a ticket, sent her by her husband, which resembled a ticket, and which she believed to be a ticket. The conductor took up the order and ejected her from the train, without first demanding that she pay her fare or get off at a station and buy a ticket. The Mississippi Supreme Court held that in the circumstances the

woman was a passenger acting in good faith, and was wrongfully ejected, for which she had a right of recovery.—*Jones v. Mobile & Ohio (Miss.)*, 72 So., 1,009.

Right to Increased Rates

The federal district court for the eastern district of Tennessee, refusing to enjoin, at the instance of a lumber company, an order of the interstate commerce commission directing the establishment of an increased rate on logs between certain points, holds that it is the duty of the commission, in passing on the reasonableness of a rate, to consider the conditions affecting the welfare of both shippers and carrier; but the carrier is not to be denied the right to change from an unreasonably low rate to a just and reasonable one merely because of the injurious consequences which would result to shippers from a change in the rate.—*McLean Lumber Co. v. United States*, 237 Fed., 460.

Twenty-eight Hour Law

Where a railroad received hogs to transfer from one carrier to another, which had been confined for nearly 34 hours, the shipper having agreed that they might be confined for 36 hours, and defendant's agent, owing to the indistinctness of notations on the way bill, failed to discover that the hogs had been confined for nearly the maximum period, and kept them confined for more than the 36 hours, the Federal District Court for the Northern District of Iowa held the company liable for a violation of the Twenty-eight Hour law, it appearing that two hours would have been a reasonable time for it to have transferred the hogs and unloaded them; the indistinct notation on the bill not affecting defendant's liability.—*United States v. Sioux City Terminal*, 234 Fed., 663.

Nebraska Freight Speed Law Unconstitutional

In actions to recover liquidated damages from a railroad for failure to comply with the Nebraska "speed law," the Nebraska Supreme Court holds that a statute or order regulating the rate of speed of the carriage of live stock is a proper exercise of the police power of the state, but such a statute or order must be reasonable, and practicable in its operation, and it must not impose an undue burden on the railroad, nor take away any of its constitutional rights.

The undisputed evidence showed that for the greater portion of the year the defendant, which operates a single-track railroad in Nebraska and other states, with several branch lines in Nebraska, cannot comply with the speed law as to west-bound shipments of live stock without sending out special trains on branch lines to transport from 1 to 4 or 5 cars, and at a cost of double the rates allowed to be charged. It was further shown that, on account of the ordinary incidents and vicissitudes of operation of a long single-track railroad, such as making up and inspection of trains at division points, waiting to meet mail, passenger, and other trains, waiting for stock from branch lines and those delays occurring by reason of storms, washouts, wrecks and other unforeseen casualties, it is often impracticable to come within the statutory limit with east-bound traffic. The statute permits of no defense by reason of any of these conditions. It was held that the statute is an unreasonable exercise of the police power of the state, and violates the constitutional rights of the defendant railroad.—*Davison v. C. & N. W. (Neb.)*, 160 N. W., 877.

Demurrage Rule—Private Cars

A demurrage rule of a railroad declared that it should apply to cars held for or by consignors or consignees, except private cars on the tracks of the owner, when used for transportation of commodities which the car owner produces. A refining company granted the railroad a right of way for a spur track over its property, the deed reciting that the ownership of the track should be in the railroad. The Circuit Court of Appeals, Sixth Circuit, affirming 226 Fed. 257, holds that the track was not, despite any advancing of money therefor, a "privately owned track," and the refining company was liable for demurrage on cars held thereon. The demurrage rule declared that private cars, while in railroad service, whether on the railroad's or private tracks, should be subject thereto. The refining company was entitled to receive from the railroad under applicable classi-

fication compensation "on loaded and empty movement" for the use of its cars. It was held that such cars were in "railroad service," and the refining company, having agreed to load and unload the cars promptly, could not, in view of the purpose of the rule, which is to facilitate shipping, escape demurrage on cars held on tracks for storage purposes beyond the free time allowed.—*National Refining Co., v. St. Louis, I. M. & S.*, 237 Fed. 347.

Fencing Statutes Not Applicable to Trespassing Human Beings

The Maine Supreme Judicial Court holds that the state fencing statute was intended to keep animals from the track, both for their own protection and that of the public, but not to keep human beings off the track, and its violation does not render a railroad liable for the death of a child who went on the track at a place where it was not fenced. Under the state statute, providing that no railroad corporation shall be liable for the death of any person being upon its road contrary to law, and that whoever without right stands or walks on a railroad forfeits a penalty, a child playing on a railroad track, though at a place where it was not fenced, is a trespasser, and the railroad owes him the duty only to refrain from wantonly or wilfully injuring him; and the burden is on one seeking to recover for the killing of a child while he was trespassing on a track to prove breach of that duty.—*Kapernaros v. Boston & Maine (Me.)*, 99 Atl., 441.

Farm Crossings in Grants and Condemnation Proceedings

In a suit to enjoin condemnation proceedings by a railroad, the Pennsylvania Supreme Court holds that where a railroad company received a right of way grant in consideration of the payment of a monetary consideration and an agreement to construct a crossing, the agreement to construct the crossing is severable in its nature from the grant, and the railroad company may rescind such agreement if necessary, subjecting itself to monetary damages only, without losing the grant.

As the act of 1868, superseding the Pennsylvania Railroad Act of 1849, made no provision for farm crossings in case the condemnation of a right of way should divide a parcel of land, the Legislature apparently deeming the right to damages sufficient, condemnation of a railroad right of way will not be defeated because no such farm crossing was provided for.—*Williams v. D., L. & W. (Pa.)*, 99 Atl., 477.

Agent's Agreement to Pay Damages Void

Action was brought by a consignee against a terminal carrier to recover damages for injury to a carload of charcoal en route from Carters, Mich., to Cedar Rapids. The charcoal was damaged by fire before it reached the defendant's line. The suit was based on an alleged agreement of the defendant's freight agent at Cedar Rapids to pay the claim. The Iowa Supreme Court held that the consignee, having accepted the freight from the terminal carrier in the knowledge that it had been damaged by the initial carrier, could not thereafter be heard to say that the damage amounted to a conversion by the terminal carrier, even though its local agent had agreed to pay the claim. The agreement was clearly beyond his authority to make, as the carrier was under no legal obligation.—*Grand Rapids Fuel Co. v. Illinois Central (Iowa)*, 160 N. W., 311.

Fires from Locomotives—Contributory Negligence of Land Owners

The Indiana Appellate Court says that it seems to be the law that where a person sees or knows that his property is in danger of destruction by fire caused by the negligence of another, he must use every reasonable effort to protect it from impending danger, and if he fails to do so he will be deemed guilty of contributory negligence. In an action for injuries to the plaintiff's farm from fire from the defendant's locomotive, it appeared that the plaintiff did not live on the farm, and it was not occupied by a tenant. The court held that this did not establish that the owner was without knowledge that the property was in danger from fire, but might be considered in determining his contributory negligence. An owner of property destroyed by fire originating on a railroad would not be contributorily negligent for failing to attempt to save his property if no efforts he could have made would have been effectual.—*B. & O. v. Peck (Ind.)*, 114 N. E., 475.

Railway Officers

Executive, Financial, Legal and Accounting

Edward E. Loomis, vice-president of the Delaware, Lackawanna & Western, has been elected president of the Lehigh Valley, succeeding E. B. Thomas.

Raymond Du Puy, president of the Virginian Railway, with headquarters at Norfolk, Va., has resigned. Mr. Du Puy's resignation is to take effect not later than May 15, 1917.

D. C. Moon, general manager of the New York Central, Lines West of Buffalo, at Cleveland, Ohio, has been appointed assistant to the vice-president in charge of operation, with headquarters at Cleveland, Ohio.

H. S. Walker, auditor of the Southern Pacific, Louisiana Lines, at New Orleans, La., has been appointed assistant auditor of the Southern Pacific, Texas Lines, with office at Houston, Tex., vice G. B. Herbert resigned to accept service with another company.

G. B. Herbert, assistant auditor of the Southern Pacific, Texas Lines, at Houston, Texas, has been appointed auditor of the Southern Pacific, Louisiana Line, and the Lake Charles & Northern, with office at New Orleans, La., vice H. S. Walker, resigned to accept service with another company.

Louis S. Taylor, elected controller of the Pullman Company, as announced in these columns last week, was born at Chicago, Ill., in July, 1872. He entered the service of the Pullman Company in September, 1889, and was assigned to the financial department, where he served in various capacities until November, 1909, when he was elected treasurer. The position of controller, to which he has just been elected, is a newly created office.

A. Atwood Cummins, announcement of whose election as treasurer of the Pullman Company was made in these columns last week, was born about 50 years ago at St. Louis, Mo. He entered commercial life for a time in St. Louis and then became identified with the banking business. In January, 1901, he was appointed special accountant of the Pullman Company and was assigned to the audit department. He was promoted to the position of auditor of disbursements in January, 1904, which latter position he retained until elected treasurer as noted above.

Operating

S. J. Kearns, superintendent of the Rochester division of the New York Central, at Rochester, N. Y., has resigned to go into other business. Effective March 1.

L. R. Huntley, car accountant of the Evansville & Indianapolis at Terre Haute, Ind., has been appointed superintendent car service, assuming duties of car accountant in addition to those of all matters pertaining to embargoes, demurrage and car service. The position of car accountant has been abolished.

A. S. Ingalls, assistant general manager of the New York Central, Lines West of Buffalo, at Cleveland, Ohio, has been appointed general manager of the Lines West, with headquarters at Cleveland, succeeding D. C. Moon, promoted, and R. D. Starbuck, assistant to the vice-president at New York, has been appointed assistant general manager of the Lines West of Buffalo, with headquarters at Cleveland, succeeding Mr. Ingalls.

Thomas J. Jones, announcement of whose promotion from superintendent of transportation of the Wabash to the newly created position of general superintendent with headquarters at St. Louis, Mo., was made in these columns last week, was born in St. Charles County, Mo., on January 26, 1876. In 1888 he entered railway service with the Wabash as a telegraph messenger, since which time he has been in the employ of this same company as telegraph operator, train dispatcher, yard master, trainmaster, division superintendent and superintendent of transportation, to which latter position he was appointed November 1, 1915. His present appointment as general superintendent became effective February 7, 1917, as noted above.

W. E. Tyler, superintendent of the Chicago, Milwaukee & St. Paul at Mendota, Ill., has been appointed superintendent with office at Green Bay, Wis., succeeding J. M. Clifford, deceased; E. G. Atkins, superintendent at La Crosse, Wis., has been appointed superintendent with office at Chicago, succeeding E. W. Morrison, who has been transferred as superintendent to Mendota, Ill., succeeding W. E. Tyler; A. C. Peterson, trainmaster at Ottumwa, Ia., has been appointed superintendent with office at Milwaukee, Wis., succeeding W. J. Underwood, deceased; N. P. Thurber, assistant superintendent at Milwaukee has been promoted to superintendent with office at La Crosse, succeeding E. G. Atkins, and Mr. Thurber's previous position has been abolished.

Albert Ewing, whose appointment as superintendent of the newly created Slaton division of the Atchison, Topeka & Santa Fe, with headquarters at Slaton, Tex., has been announced in these columns, was born at Princeton, Ill., on July 7, 1875. Shortly after leaving school he began railway work with the Chicago, Burlington & Quincy in October, 1891. On September 1, 1897, he entered the service of the Atchison, Topeka & Santa Fe as a telegraph operator and agent, and up to November 1, 1903, served in this capacity at various stations on the Eastern, Southern, Chicago and Western divisions. From November 1, 1903, to February 1, 1905, he was transportation clerk to the general superintendent of this same company, with office at La Junta, Colo., and from February 1, 1905, to June 1, 1909, he was chief clerk to both the general superintendent at La Junta and the superintendent at Newton, Kans. In June, 1909, he was appointed trainmaster of the Rio Grande division, being transferred in October, 1910, to the Missouri division, and in March, 1914, to the Illinois division, with headquarters at Chillicothe, Ill.

Charles E. Johnston, chief engineer of the Kansas City Southern, at Kansas City, Mo., who has been appointed general manager, a newly created position, with the same headquarters, was born at St. Elmo, Fayette county, Ill., on October 30, 1881. He began railroad work in 1897, as a chainman on railroad location in southern Illinois. From that time until January, 1900, he held minor positions in the engineering departments of the Chicago & Eastern Illinois and the St. Louis-Southwestern. He entered the service of the St. Louis & San Francisco in January, 1900, as a levelman on the location of a new line in Indian Territory, and remained with that road until February, 1903, when he became a resident engineer on the location and construction of the "White River line" of the Missouri Pacific between Carthage, Mo., and Newport, Ark. In May, 1903, he returned to the St. Louis & San Francisco as assistant engineer maintenance of way. He was appointed locating engineer of the Kansas City Southern in October, 1906, and continued in that position until August, 1908, when he was transferred to the general engineering office of the company at Kansas City, Mo., as office engineer. In June, 1909, he was appointed division engineer, with headquarters at Mena, Ark., in charge of company forces employed in reconstruction work. He continued in that work until January 1, 1911, when he was appointed chief engineer, with office at Kansas City.

Frank J. Easley, whose promotion from assistant general manager of the Denver & Rio Grande, Colorado Lines, to general manager of the entire system, was announced in these columns last week, was born at Apple River, Ill., on August 18, 1860. He entered railway service with the Kansas Pacific in 1879 as a brakeman. From 1882 until 1895, he was consecutively brakeman, freight and passenger conductor, train dispatcher, trainmaster and division superintendent on the



C. E. Johnston

Atchison, Topeka & Santa Fe. In 1895 he was appointed superintendent of the Mexican Central, but returned to the Santa Fe in 1907 as division superintendent, at Newton, Kan. From 1907 to 1912 he was division superintendent of the Chicago, Rock Island & Pacific, at Rock Island, Ill., and from 1912 to 1916 he was assistant general manager at Des Moines, Ia. On June 1, 1916, he was appointed assistant general manager of the Denver & Rio Grande, and held that position until his promotion to general manager. He relieves A. E. Sweet, vice-president, of the duties of general manager. The title of assistant general manager, Colorado Lines, has been abolished.

O. C. Castle, whose appointment as superintendent of car service for the Southern Pacific, Texas and Louisiana lines, has been announced in these columns, was born at Brownsville, Pa., on January 22, 1874.

He entered railway service in 1892 as a messenger in the telegraph department of the Pennsylvania Lines West at Dennison, Ohio. In 1893, he was promoted to operator, and until 1900, filled various positions in station and telegraph service on the Pittsburgh division. In October, 1900, he entered the service of the Baltimore & Ohio, at Baltimore, Md., where he was given charge of mileage accounts and statistics in the office of the superintendent of car service. He was later promoted to assistant chief clerk of the department. In March, 1902, he was transferred to the general manager's office. In June, 1903, he was appointed chief clerk to the superintendent of the Butler division. In May, 1907, he went to Chicago with Arthur Hale, agent of the American Railway Association, and assisted in the organization of the American Railway Clearing House and the Committee on Car Efficiency of the American Railway Association. As statistician for the American Railway Association he inaugurated the association's system of car performance statistics, and surplus and shortage bulletins. He worked with the commission on Interchange of Freight Cars in making a scientific study of the per diem value of a freight car, resulting in the adoption in 1910 of the 30 and the 35 cent variable per diem rate. On August 15, 1911, he was appointed car service agent on the Sunset Central system of the Southern Pacific, which was the position he held at the time of his recent promotion, as noted above.

Willis H. Ogborn, traffic manager and auditor of the St. Joseph Valley, at La Grange, Ind., has been appointed general manager in charge of the operating, traffic and accounting departments with headquarters at La Grange, vice M. Blizard, resigned, and the position of traffic manager and auditor has been abolished. Mr. Ogborn was born on September 27, 1872, at LaFayette, Ind., and was educated in the high school of his native town. He began railway work in March, 1887, and served consecutively as a clerk and agent on the Lake Erie & Western until April, 1891, when he went to the Wabash and served in the same capacity. From April, 1893, to January of the following year he was a clerk in the freight department of the Atchison, Topeka & Santa Fe at Chicago; then to December, 1897, was rate clerk on the Chicago, Rock Island & Pacific. He subsequently served as rate clerk and contracting agent on the Wabash until February, 1901, when he was appointed general freight agent of the Barry Steamship Company, Chicago, remaining in that position until September, 1903. He was then chief clerk to the manager of the Lehigh & Wabash Despatch. In December, 1906, he was appointed general freight and passenger agent of the Illinois Southern at St. Louis, Mo., remaining in that position until February, 1915. He subsequently was appointed traffic manager and auditor of the St. Joseph Valley which position he held at the time of his recent appointment as general manager of the same road as above noted.



O. C. Castle

Traffic

W. Heuerman has been appointed commercial agent of the Chicago, Burlington & Quincy, with office at St. Louis, Mo., vice G. H. Gray, resigned.

R. D. Jennings, traveling freight agent of the Southern Pacific, with headquarters at Portland, Ore., has been appointed general agent, with office at Spokane, Wash.

Brent Arnold, Jr., general agent, freight department of the Cleveland, Cincinnati, Chicago & St. Louis, with office at Cincinnati, Ohio, has been appointed division freight agent, with headquarters at Louisville, Ky., succeeding E. L. Roederer, transferred to Cleveland, Ohio, as division freight agent to succeed J. M. Breen, resigned to enter other business. J. E. Anderson, commercial agent at Detroit, Mich., has been appointed general agent in the freight department at Cincinnati, Ohio, succeeding Brent Arnold, promoted. E. M. Snell, succeeds J. E. Anderson as commercial agent at Detroit.

G. H. Kerr, commercial agent of the Southern Railway System at Atlanta, Ga., has been appointed assistant general freight agent, with office at Atlanta. J. N. Templeton, commercial agent at Birmingham, Ala., has been appointed division freight agent, with office at Selma, Ala. H. D. Luckett, commercial agent at Charleston, S. C., has been appointed division freight agent at Columbia, S. C., and the following have been appointed commercial agents: Paul A. Wright, at Birmingham, Ala.; E. M. Ramsey, at Charleston, S. C.; C. C. Elder, at Charlotte, N. C.; and William Humphreys, commercial agent at Cincinnati, Ohio, has been appointed commercial agent at Atlanta, Ga.

John L. Steadwell, announcement of whose appointment as general freight agent of the Nashville, Chattanooga & St. Louis, with headquarters at Nashville, Tenn., was made in these columns two weeks ago, entered railway service with the Baltimore & Ohio in 1882 as stenographer. Four years later he accepted a position with the Nashville, Chattanooga & St. Louis, but resigned after a few weeks' service to enter private business. A year later he became connected with the old Richmond & Allegheny, now the James river division of the Chesapeake & Ohio. In January, 1890, he entered the service of the Nashville, Chattanooga & St. Louis as a stenographer, since which time he has advanced consecutively through the various grades of general clerk, executive clerk of the rate department, chief clerk of the traffic department and assistant general freight agent, to which latter position he was appointed on April 6, 1907. For the last two years Mr. Steadwell has spent most of his time in Washington assisting the committee on revision work in complying with the orders of the Interstate Commerce Commission in the so-called long and short haul cases. For a year prior to that he was a member of the uniform classification committee, which had in charge the unifying of freight classifications throughout the United States.

Engineering and Rolling Stock

Frank Helm has been appointed division engineer of the Atchison, Topeka & Santa Fe, with office at Slaton, Tex., a newly created position.

C. W. Hyde, road foreman of equipment of the Chicago & Eastern Illinois at Salem, Ill., has been appointed master mechanic on the Illinois division, with headquarters at Villa Grove, Ill., succeeding W. R. Meeder, resigned.

Purchasing

H. J. Reed has been appointed division storekeeper of the St. Louis-San Francisco, with headquarters at Cape Girardeau, Mo., succeeding H. G. Cummins, resigned.

OBITUARY

Joel Dean, general manager of the Atherton & Gulf, died at his home in Atherton, Tex., February 15, 1917, age 35 years.

M. H. Dooley, chief claim agent of the Southern Railway, with headquarters at Washington, D. C., died at his home in that city on February 18, at the age of 70.

Reuben Clinton Kelly, who retired as assistant secretary of the Pullman Company on January 1, 1914, died at his home in Wheaton, Ill., on February 16, at the age of 73.

Equipment and Supplies

LOCOMOTIVES

THE GRAND TRUNK is reported as contemplating the purchase of 25 locomotives.

THE LEHIGH VALLEY, reported in the *Railway Age Gazette* of February 9 as inquiring for 36 Santa Fe and 20 Pacific type locomotives, has ordered these locomotives from the Baldwin Locomotive Works.

THE NORTHERN RAILWAY OF SPAIN has ordered 40 superheater Mikado locomotives from the American Locomotive Company. These locomotives will have 23 and 25¼-in. cylinders, and a total weight in working order of 196,000 lb.

FREIGHT CARS

THE BIRMINGHAM SOUTHERN is inquiring for 200 100-ton hopper cars.

THE PENNSYLVANIA COAL COMPANY is asking for prices on 200 mine cars.

THE BUFFALO, ROCHESTER & PITTSBURGH is asking for prices on 20 caboose cars.

THE CONSTANTINE REFINING COMPANY has ordered 10 tank cars from the General American Tank Car Corporation.

THE LOUISVILLE & NASHVILLE has ordered 1,000 underframes from the Bettendorf Company for 700 box, 200 stock and 100 refrigerator cars, which it will build in its own shops.

THE CHICAGO, MILWAUKEE & ST. PAUL, reported in the *Railway Age Gazette* of January 26 as being in the market for 250 flat and 250 refrigerator cars, has ordered the flat cars from the Bettendorf Company.

THE SOUTHERN PACIFIC has ordered 200 12,500-gal. capacity tank cars and 126 50-ton drop bottom gondola cars from the Ralston Steel Car Company, and will build 1,000 40-ton box, 250 stock, 100 flat and 15 caboose cars in its Houston, Tex., shops for its lines in Texas and Louisiana. These cars are in addition to 2,950 cars reported in the *Railway Age Gazette* of February 20 as having been ordered from the Sacramento shops.

PASSENGER CARS

THE LOUISVILLE & NASHVILLE has ordered 8 coaches, 6 baggage and mail cars, 4 chair cars and 3 dining cars from the American Car & Foundry Company.

IRON AND STEEL

THE NORTHERN PACIFIC has ordered 5,000 tons of 90-lb. rails from the Illinois Steel Company.

THE CHICAGO STEEL CAR COMPANY has placed an order for 150 car frames amounting to 480 tons.

THE KANSAS CITY TERMINAL has ordered 1,500 tons of 85-lb. rails from the Illinois Steel Company.

THE TERMINAL RAILROAD ASSOCIATION OF ST. LOUIS has ordered 120 tons of steel from Stupp Bros. Bridge & Iron Company for repairs to the Eads bridge, and 600 tons from the American Bridge Company for the iron girder span on the Wiggins Ferry connection at Venice, Ill.

TRACK SPECIALTIES

THE CHICAGO, BURLINGTON & QUINCY is inquiring for 6,000 tie plates.

THE NEW YORK CENTRAL is reported as having placed an order for 6,000 tie plates.

Supply Trade News

Cyrus J. Holland has joined the selling force of the Keyote Railway Equipment Company, with headquarters at Chicago, Ill.

W. W. Lavarack has resigned from the General Railway Signal Company to take the position of resident manager of the Signal Accessories Company, with headquarters in New York. He has also been elected a director of the company.

H. A. Hoffman, formerly with the General Electric Company (steam flow meter department), has been placed in charge of the Philadelphia branch office of the Lagonda Manufacturing Company of Springfield, Ohio, with office in the Pennsylvania building.

J. A. White, formerly manager of the Boston and Chicago branch offices of the U. S. Light & Heat Corporation, has recently been appointed manager of sales, battery department, with offices at Niagara Falls, N. Y. W. W. Halsey has been appointed manager of the New York sales office of the company.

H. A. Gray, assistant manager of railroad sales of Joseph T. Ryerson & Son in charge of eastern territory, has been appointed manager of sales of the railroad department of that company, with headquarters in Chicago. Mr. Gray has been in the service of Joseph T. Ryerson & Son for 16 years. He was born at Alton, Ill., November, 1878, and received his education at the high schools of Evanston, Ill., and at St. Paul's School, Concord, N. H. He entered the service of Joseph T. Ryerson & Son in 1901, and was connected with various departments of the business both in Chicago and New York. He became associated with the railroad department in 1913, and in March, 1916, was appointed as-



H. A. Gray

assistant manager of railroad sales.

Edward Weldin Grieves died recently at his home in Baltimore. Mr. Grieves was born in Wilmington, Del., in 1843, and educated in private and public schools of Wilmington. For many years he was superintendent of the car plant of Harlan & Hollingsworth, at Wilmington, which position he relinquished in 1884 to take the superintendency of car building for the Baltimore & Ohio at Baltimore. Mr. Grieves left the Baltimore & Ohio in 1898 to become mechanical expert for the Galena Oil Company and president of the Farlow Draft Gear Company. He retired from active business two years ago.

At a recent meeting of Jenkins Bros., New York, Farnham Yardley, son-in-law of the late Alfred B. Jenkins, and formerly vice-president, was elected president of the company to fill the vacancy caused by the death of Mr. Jenkins. Frank T. Swain, general manager of the company, was elected vice-president. Samuel Laird, manager of the Philadelphia business, has been elected a director to fill the vacancy in the board. With these exceptions, the officers and directors are the same as heretofore. The interests of Mr. Jenkins as a stockholder of the company will remain intact, under a trust created by his will, for the benefit of his descendants. The policy of the company as laid down by Mr. Jenkins will be adhered to and maintained in all departments of the business.

The General Roofing Manufacturing Company of St. Louis, Mo., has announced that it purchased the Mound City Paint &

Color Company and the Gregg Varnish Company, both of St. Louis, and the Lockport Paper Company of Niagara Falls, N. Y., on February 1. A new corporation, including these companies, has been organized, and will be known as the Certain-teed Products Corporation. The new company is capitalized at \$25,000,000. The following officers were elected: George M. Brown, president; Smith E. Allison, New York City; Audenried Whittemore, Chicago; J. S. Porter and J. F. Schlafly, of St. Louis, vice-presidents; J. C. Collins, of St. Louis, secretary and treasurer, and Clinton Brown, assistant secretary and treasurer. All formerly were officials of the General Roofing Manufacturing Company. While the General Roofing Manufacturing Company already has offices in nearly all the large cities, new offices will be opened in Buffalo, N. Y.; Milwaukee, Wis., and Salt Lake City, Utah. The headquarters will remain in St. Louis as at present.

The National Railway Appliance Company, a new concern, incorporated for the purpose of selling railway supplies, announces that it has taken over the entire railroad department business of the U. S. Metal & Manufacturing Company. The new company will have temporary offices at 165 Broadway, New York City, and the officials elected to carry on the affairs of the concern are as follows: President, B. A. Hegeman, Jr.; first vice-president, Charles C. Castle; vice-president and treasurer, Harold A. Hegeman; assistant to president, F. C. Dunham; secretary and engineer, Edward D. Hillman. The company has established a branch office in the McCormick building, Chicago, under the immediate management of Walter H. Evans, and a branch office in the Munsey building, Washington, D. C., under the management of J. Turner Martyn. Both managers were formerly connected with the railroad department of the U. S. Metal & Manufacturing Company.

M. C. M. Hatch, superintendent of fuel service of the Delaware, Lackawanna & Western, has resigned to accept a position as assistant to the president of the Locomotive Pulverized Fuel Company of New York. Mr. Hatch was born in Chelsea, Mass., in 1882. He attended the public schools in that city and in Boston, and spent two years in the Massachusetts Institute of Technology, and two years at the University of California, in the latter institution taking the course in mechanical engineering as a member of the class of 1903. He then spent about 18 months in the shops of the Southern Pacific at West Oakland and Sacramento, Cal., followed by six months in the test department, and six months in the signal department of the same road. In June, 1905, he returned East and went to work in the mechanical department drafting room of the Boston & Maine. He remained with that company until October, 1911, serving during the last five years of that period as chief draftsman. From October, 1911, to April, 1912, he was engineer of tests of the New England lines, that is, of the New Haven, Boston & Maine and the Maine Central. In April, 1912, as above noted, he became superintendent of fuel service of the Delaware, Lackawanna & Western.



M. C. M. Hatch

TRADE PUBLICATIONS

WROUGHT IRON PIPE.—The A. M. Byers Company, Pittsburgh, Pa., recently issued Bulletin No. 27, which contains reprints of letters from users of their products.

TOOL STEEL.—A folder recently issued by the Vanadium-Alloys Steel Company, Pittsburgh, Pa., deals with the company's Vasco special, Vasco electric and Vasco Latrobe carbon tool steels.

Railway Construction

BALTIMORE & OHIO.—Plans are being made to build a 2-mile line from Sago, W. Va., to a connection with the Coal & Coke Railway at Hampton. The cost of the work will be about \$100,000.

BURLINGTON, SOUTH CHICAGO TERMINAL RAILROAD.—As noted in the *Railway Age Gazette* of February 16, this company has been incorporated with a capital of \$1,500,000 to build a belt line from One Hundredth street, Chicago, Ill., 10 miles southwest. The road will serve a 25-acre tract of land recently acquired by the Chicago, Burlington & Quincy, with a frontage on the west bank of the Calumet river, extending from One Hundredth street to One Hundred and Sixth street, a distance of about three-quarters of a mile. This property is already well developed for shipping with track and dock facilities, including a six-stall roundhouse and a large warehouse. The land is said to be valued at about \$1,500,000, and is situated in a territory which is becoming an important grain-handling center. The Chicago & North Western is now erecting a large grain elevator on the river at One Hundred and Twentieth street at a cost of about \$2,500,000, and the Burlington will ultimately erect a grain elevator on its property. The incorporators of the railroad are all officers of the Chicago, Burlington & Quincy, viz.: Hale Holden, president; Edward M. Shelton, assistant to the general counsel; H. E. Byram, vice-president; C. G. Burnham, vice-president in charge of traffic, and Elmer A. Howard, vice-president in charge of the land and industrial department.

CHICAGO, BURLINGTON & QUINCY.—Requests for bids on grading and hauling material for a line between Moberly, Mo., and Monroe City, 46 miles, were sent out recently. The work involves 3,500,000 cu. yd. of embankment and excavation, a maximum westbound grade of 0.4 per cent, and a maximum eastbound grade of 0.3 per cent, and maximum curves of one degree. A 600-ft. steel trestle will be built over the Salt river, near Stoutsville. A bridge of about the same length and of similar construction will be built over the middle fork of the Salt river, near Holliday.

CHRISTIE & EASTERN.—This company which was organized to build a line from Shreveport, La., to Longleaf, about 60 miles has most of the grading work completed. Contract for the work has been given to J. S. Moore & Son, Lufkin, Texas. The line is being built to carry lumber and stone. A. J. Peavy, president, Shreveport, and Frank Shults, Chief Engineer, Hornbeck. (February 16, p. 295.)

CLINTON & OKLAHOMA.—This company is making preliminary surveys for an extension of its line from Clinton, Okla., to Colony, about 7 miles. J. C. Mytinger, assistant to president, Wichita Falls, Tex.

FLORIDA ROADS.—The St. Augustine Public Service Corporation has applied to the city commissioners of St. Augustine, it is said, for an extension of one year to complete work on the line from St. Augustine north to Jacksonville, about 40 miles. A construction contract is reported let to Samuel Stevenson Sons & Co., New Haven, Conn.; 7½ miles of grading and 3½ miles of track have been laid from South Jacksonville. T. R. Osmond, St. Augustine, is interested. (September 8, p. 434.)

KENTUCKY SOUTH EASTERN.—Contracts are to be let this year to build a line from Indian Head to the Cumberland river in McCreary county, Kentucky, thence south via Bear Creek Junction, Tenn., to the mouth of Bear Creek about 25 miles. The work involves handling a total of about 500,000 cu. yd., one third dirt and two thirds rock. There will be one steel bridge 1,000 ft. long requiring 2,000 tons of steel, and two 150 ft. tunnels on the line which is to be built to carry coal and timber. G. B. Durell, president, Cleveland, Ohio, and L. E. Bryant, chief engineer, Roberta, Tenn.

MIDLAND & NORTH WESTERN.—This company is about to start track laying on its extension from Midland, Tex., to Seminole, a distance of about 65 miles. This work has been at a standstill

for some time, but conditions are now such that it is expected that the line will be rushed to completion by May 1. T. W. Thaxter, chief engineer, Midland, Tex.

MISSISSIPPI & WESTERN.—A charter has been given to this company in Mississippi with \$50,000 capital. Construction work is to be started at once on a line from Stevens, Miss., on the Gulf Mobile & Northern, to Paulding, about 18 miles. C. W. Fouke, president and general manager; G. Webber, vice-president and general solicitor; R. M. Read, secretary and A. Winham, treasurer, Texarkana, Arkansas.

NORTH CAROLINA ROADS.—Bids are wanted until February 28 by Jerome Moltz, care of R. S. Brown, chief engineer, Legal building, Asheville, N. C., for grading the roadbed of about six miles of standard gage logging railroad. The projected route is from a connection with the Southern Railway at Lake Toxaway, N. C., to Cold Mountain Gap. Separate bids will also be received on trestles and track laying.

OSAGE COUNTY & SANTA FE.—This line has just been located between Owen, Okla., on the Bartlesville branch of the Atchison, Topeka & Santa Fe, and Fairfax on the East Oklahoma branch, about 65 miles. The construction of the line will involve heavy grading work and considerable bridging.

SOUTH CAROLINA ROAD.—(Electric.)—Plans are being made to build an electric line from Columbia, S. C., west via Lexington to Saluda, and thence to Greenwood, about 70 miles. A connection is to be made with the Piedmont & Northern at Greenwood. A. G. Guignard, Columbia, is said to be interested.

WATAUGA & YADKIN RIVER.—Regarding the report that this company plans to build an extension, an officer writes that surveys have been made for an extension from Grandin, N. C., to Lenoir. Residents along the proposed extension are offering certain inducements, but the company has not yet decided to build the line.

RAILWAY STRUCTURES

ALBANY, GA.—The Atlantic Coast Line is making plans to replace the present wooden trestles on the bridge over Front street, Albany, with steel on concrete abutments.

ARGENTA, ARK.—The St. Louis, Iron Mountain & Southern contemplates the erection of a frame car repair shop at this point soon, to cost approximately \$20,000.

BALTIMORE, MD.—The Pennsylvania Railroad has given a contract to D. M. Andrew & Company, Baltimore, Md., for putting up an office building and warehouse at Jackson's Wharf.

GREENVILLE, N. J.—The Pennsylvania has given a contract to Henry Steers, Inc., New York, for building a new car repair yard at Greenville, N. J.

JACKSONVILLE, FLA.—The Jacksonville Terminal Company will open bids on March 18, it is said, for work on the new union passenger station to be built at Jacksonville. The terminal will be on Lee street at West Bay street and will cost about \$1,000,000. (August 18, p. 309.)

LANSING, MICH.—The Pere Marquette is contemplating the erection of a new water station at Lansing, Mich., with an electrically-driven pump, drawing water from a lake about one-half mile distant. The estimated cost of the station is \$7,500.

POCATELLO, IDAHO.—The Oregon-Washington Railroad & Navigation Company will construct an addition to its coach and boiler shops at this point, approximately 180 ft. by 150 ft. A subway for the use of shop employees will also be constructed in the near future. It is contemplated, in addition, to lengthen 15 stalls in the present engine house from 82 ft. to 96 ft.

HEAVY RAIL EXPORTS.—Rail exports from the United States for the 11 months to Dec. 1, 1916, were 499,224 gross tons, exceeding the 1913 record which was 460,553 tons. In November last they were 55,022 tons with the average for September, October and November at 64,817 tons. The 1916 exports probably exceeded 550,000 tons. Of the 499,224 tons to Dec. 1 Russia took 112,219 tons; the West Indies and Bermuda, 77,842 tons; Canada, 35,577 tons, and other countries, 221,365 tons.

Railway Financial News

BOSTON & MAINE.—At a hearing before the committee of the Massachusetts legislature, which is considering a bill providing for the repeal of the act of 1915, which authorizes the reorganization of the Boston & Maine, George L. Mayberry, counsel for the federal trustees of the majority stock, said that in the opinion of these trustees there was greater need for reorganization of the Boston & Maine than before the road was put into temporary receivership last August, and Mr. Mayberry pointed out that if the bill permitting the reorganization were to be repealed, the company's sole means of getting out of its present difficulties would be removed.

The United States district court for the district of Massachusetts has ordered James H. Hustis, temporary receiver of the Boston & Maine, to pay interest on the bonds and notes of the Connecticut River Railroad.

COAL & COKE RAILWAY.—Control of this company, the Roaring Creek & Belington and the Davis Colliery has been sold by the estates of H. C. Davis, Stephen B. Elkins and Richard C. Kerens. Charles D. Norton, vice-president of the First National Bank of New York, has been elected president of the Coal & Coke.

MISSOURI, KANSAS & TEXAS.—A press despatch from Dallas, Tex., says that suit has been brought by the Bankers' Trust Company of New York, as trustee of the Missouri, Kansas & Texas second mortgage bonds, to foreclose under that mortgage. There are \$20,000,000 second mortgage bonds outstanding.

NASHVILLE, CHATTANOOGA & ST. LOUIS.—An agreement has been reached between the Nashville, Chattanooga & St. Louis and the Western & Atlantic Railroad Commission of the State of Georgia which provides for the re-leasing of the Western & Atlantic at the expiration of the present lease, December 27, 1919, of this road, to the Nashville, Chattanooga & St. Louis for 50 years for an annual net cash rental of \$540,000 and \$60,000 per year to be spent for improvements. Under the new lease the Nashville, Chattanooga & St. Louis will have to pay taxes on rolling stock and equipment which it owns, which taxes accrue to the benefit of the counties through which the road runs. In the present lease there is no such provision.

SOUTHERN RAILWAY.—The directors have decided to postpone the plan which had already been approved for the creation of a new mortgage and the exchange of the outstanding development and general mortgage 4s for new 4½ per cent bonds.

TENNESSEE CENTRAL.—Judge Sanford, in the United States district court, has fixed April 3 as the date on which the Tennessee Central is to be sold under foreclosure. The upset price has been fixed at \$700,000 and the purchaser buys the property subject to all taxes for 1916 and 1917.

TIDEWATER SOUTHERN.—See Western Pacific.

WESTERN & ATLANTIC.—See Nashville, Chattanooga & St. Louis.

WESTERN PACIFIC.—The California railroad commission has been asked to approve of the purchase by the Western Pacific of the Tidewater Southern. The Tidewater Southern runs from Stockton, Cal., to Modesto, 33 miles.

TORNEA RIVER BRIDGE CONSTRUCTION.—The bridge over the Tornea river, between Tornea, Finland, and Haparanda, Sweden, is to be a single-track bridge, but in view of the fact that the Russian railway gage is wider than the Swedish two sets of rails will be laid. The bridge can thus be used by both Russian and Swedish rolling stock, though not at the same time. The bridge is to have a swing section. According to present proposals, the bridge will comprise eight spans—two spans of 40 meters (131 feet), and two of 60 meters (197 feet), on the Swedish side of the frontier, and two spans of 60 meters on the Russian side, with two spans for the swing section, each having a free span of 30 meters (98 feet). The total length of the bridge will be 405.24 meters (1,320.52 feet).—*Commerce Report.*